Samoan Hoya Species

Preliminary Presentation 26 Mar. 2014

by Dale Kloppenburg

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Introduction

The present study was undertaken with the cooperation of Dr. Art Whistler of the University of Hawaii. He kindly sent me his collection of Herbaria sheets which form the major basis for the following detailed study. He also sent me a collection of photo slides taken of the hoya species as they were collected and studied by him in Samoa. My tendency is to look at all the details of a plant and not to gloss over characters I feel may be important in delineating species. I have observed after years of collecting that most species are limited to small areas and to rather narrow elevation and environmental niches. Suffice it to say there are a few species, which are widely adapted and have a broad variability (cline). Even these broadly distributed hoya species seem to be confined to specific elevations. Because of my observations, these habitat patterns are uppermost in my considerations and I am slow to lump materials unless specific data shows otherwise. I have also found that the type descriptions in particular become eroded, expanded and denigrated over time. Many later descriptions are in direct contradiction to earlier Type descriptions and yet this later material is often used in citing synonymies.

I have discussed under "Materials and Methods" some of the difficulties in photographing these very small structures. There is a loss of resolution and detail at every step of the process in bringing this work to publication. I suppose we all wish for more money, better equipment, and above all more time. The expenses and time of all this work is borne by me personally. Many thousands of negatives and pictures have been filed and labeled. These form the data base for this and further studies. I feel a photographic record is invaluable, since at any time I can refer back to the actual photo. I continually re-photograph species so I am able to study any variations occurring over time. In addition, clones bloomed in many locations are added to the photographic and data record on a continuing basis, along with drawings and critical measurements. With the advent of computers it is easy to make necessary corrections and additions to a data base and to then from time to time release updated publications.

Finally it is much more difficult to work with herbarium material than it is with fresh material especially the flowers. There is slight differences in measurements that occur between in vitro and in vivo material. One also cannot see the overall presence that a living plant presents. All we have on a herbarium sheet is a stem laid flat, there is no conveyance of vigor, whether it clumps, dangles, twines, rambles, creeps or many of the other distinct character a live plant conveys. The field observation is a far superior method in determining hoya species than attempting to do the same from herbarium sheets. Actually a combination of these to methods is almost essential to getting it right!

Methods and Materials

Flowers were removed from the Herbarium sheet envelopes placed in a petri dish, wetted with Kew solution (alcohol, glycerin, & formalin) to soften and restore the tissue, to plump it up a little. The specimens are then covered with a watch glass for 12 -24 hours or longer until ready to photograph. For all flower parts except the Pollinarium I use a Swift binocular scope and a 10X lens (there is a 30X power lens for detail conformation).

Most hoya flowers are large enough so that only portions of the flower parts can be viewed at a time. I start with the pedicel then the calyx inside and out, the outside surface of the corolla at its center and then the lobes and sinus area. I photo the flower inside (the corona and corolla -top view), remove the corona and photo the corolla inside and at the sinus areas and the bottom view of the corona. Next a coronal scale is removed by cutting down through the anther wing area on either side of the lobe with a fine needle and it is photographed in side view.

All these parts are measured and the data compiled. Before the coronal scale is removed the pollinia are removed as detailed below. Each part is illuminated by a tensor lamp laying cocked sideways so as to illuminate the part and I have learned over time that a 8 second exposure works well. All parts are retained dried and returned to the herbarium sheet envelope.

After compiling all the pertinent data and putting it into comparative tables, I then endeavor to first pick out the obvious differences, which set asides certain individual herbarium material as distinct within a grouping. First Samoan hoya species can immediately be divided into palmately nerved and pinnately nerved leaf groups. In the past there have been 4 palmately nerved species described and 6 pinnate nerved species. Many of these were lumped together recently.

Pollinaria of the Hoya flower are very small but the five dark brown colored retinacula are readily visible in the crown of the hoya flower without the aid of magnification. In working to remove the pollinarium I use a "Swift" binocular microscope with 10X magnification. With the sharp end of a fine sewing needle inserted under the outer end of the retinaculum, a gentle lift will usually release the entire structure intact. Those removed are placed on a slide with a 1 mm imbedded graduated scale, as a measuring device, divided into microns (100 parts). The slide is wetted with a drop of Kew solution (glycerin, water, and formaldehyde). The removed pollinaria are easily transfer to the wetted area. Most pollinarium can be examined at thirty power or above. At around 30-40 magnifications the pollinarium are easy to focus since the field depth is relatively small. An overall view is good at these magnifications.

I have found that a magnification of 100 power is best for detailed study of most hoya pollinarium. For this I use a Bausch & Lomb monocular scope. It is provided with a EW 10 XD/20.50 -14.5 mm eyepiece. The 10x lens is 0.25 (100 magnification +) By the

time the pollinarium is in good general focus in a SLR camera the magnification with this lens combination is approximately 160X (actually it is slightly more than 162). My camera is provided with a microscope adapter, which allows me to switch from the Swift binocular scope (for extraction) to the monocular for measurements and photography. The camera mounts on the eyepiece, and the SLR feature allows visual focusing through the microscopes lens system.

Problems encountered: At near 100X magnification even though the pollinarium is a small object (we are dealing with fractions of a millimeter) the depth through which you must focus becomes greater (the depth of field is shallower). This requires a number of photos at various focal planes to record all the features. Thus presentations must be of a number of photos or composites. The retinaculum is especially deep i.e. three dimensional and thick, especially at the head and central portion. The photos in the data pages are a best average photo depiction of the structure or a composite in a few cases. At 165 magnifications some pollinarium are too large to fit within the view area and thus must be a composite of at least two photographs.

Problem areas in addition to the above are:

(1) When removing pollinarium, both pollinia do not always stay adhered to the caudicle. In some instances neither of the two pollinia may remain attached. The longer the flower is open the more this becomes true.

(2) Occasionally, especially from herbarium material, the pollinia may be withered (not the general situation). Preserved dry flowers must be thoroughly soaked in Kew solution (or boiled) before removal is practical.

(3) Destruction of the pollinia (since it represents high protein) by bupestids or other insects is occasionally encountered.

(4) A few pollinarium, especially very large ones, have a tendency to lie at a 45° angle to the surface of the slide when still attached to the caudicle, so to measure their true width, they must be separated from the caudicle and then maneuvered to lay flat.

(5) One must work quickly since the heat from a strong light source will start to deform (wither) the pollinia even when in the Kew solution on a slide.

(6) Upon extraction from the anthers the pollinia and retinaculum often twist and turn. This is especially true of translators located well down the retinacular column. It becomes a real challenge to get them to lie in their original configuration, and flat on the slide. Long retinaculum with the translators attached well down on the column tend to raise their head (the inner apex) above the slide surface, adding to the depth of the focal plane. This adds to the difficulty of getting a single clear photo of the structure. In some cases the twisting is almost impossible to undo. Drying the slide is an aid and using two

needles for manipulation helps. The pollinarium of course can be studied from the top (normal positioning) or turned on its back and studied from the bottom.

I have been using 200 ASA speed color film. The faster speed film cuts down on the exposure time (and thus camera battery renewal). I at first used the auto exposure meter of the camera but learned that most photos were overexposed (more true for floral parts than of the pollinarium through the monocular scope). With a tensor lamp directly below the stage, directed up through the field it takes only a fraction of a second for full exposure, possibly 1seconds. I now use the bulb camera setting. Photos show more and clearer detail then the photocopies or scanned images presented here but are too expensive to use in this presentation.

All Samoan hoya species descriptions were accumulated and special characteristics of each were noted. There are a few special characteristics that authors have noted that are usually overlooked. One is Dr. Schlechter's mention of the short translators and minute retinaculum in *Hoya betchei*; another is the deciduous character of the peduncles on *Hoya chlorantha*. All characters are important and the variability of characters needs to be constantly kept in mind and studied. Since Samoan hoya material has also been allied with Fijian species and those with Vanuatu and New Caledonian material, those possibly alliances need to be considered and the Samoan species compared with these other species. My friend Dr. Whistler felt the palmate species were synonymous with *Hoya pottsii* Traill, but I do not see the similarity and would not consider them to be co specific only connection seems to be in the nervation.

Note: all my measurements are in cm (Centimeters) except where noted and measurements of pollinaria which are in mm (millimeters). *Hoya australis* and associated species and varieties has been mostly omitted from this presentation.

Species

attenuata Christophersen 1935 Bishop Mus. Bull. "Samoan Flowering Plants" 128:187. Christophersen.

australis R. Brown ex Trail 1830 Transactions of the Horticulture Society 7:28. James Traill.

The Samoan Island H. australis is a subspecies with glossy, glabrous foliage, subspecies tenuipes Forster and Liddle. "Austrobailea 3/3:1991

betchei (Schlechter) Whistler 1913 Botanische Jahrbücher 50:127. "Die Asclepiadaceen von Deutsch Neu Guinea" R. Schlechter.

chlorantha Rechinger 1908 Repertorium Specierum Novarum 5:131 Richinger.

There is also a variety of this species *H. chlorantha tutuilensis* Christophersen "Bishop Museum Bulletin" 128, 187-191:1935

filiformis Rechinger 1908 Repertorium Specierum Novarum 5:132 (Fedde)

		Rechinger.
pubescens Reinecke	1898	Botanische Jahrbücher 25:669. Engler's (Reinecke) "Die Flora der Samoa-Inseln II.
pycnophylla Rechinger	1908	Repertorium Specierum Novarum 5:133. (Fedde) Rechinger.
samoensis Seemann	1866	Flora Vitiensis, 161-163. B. Seemann.
upoluensis Reinecke	1893	Botanische Jahrbücher 25:669. Engler's (Reinecke) "Die Flora der Samoa-Inseln".
whistleri Kloppenburg	2002	Fraterna 15/1, 7-10, International Hoya Association.

x tuafanua Whistler & Kloppenburg 2002 Fraterna 15/3, International Hoya Association.

Species Descriptions and Literature

Hoya attenuata Christophersen

Type Description:

In Bulletin of the Bishop Museum "Samoan Flowering Plants" 128 (1935) 187. Christophersen. **Hoya attenuata** Christopher *Hoya attenuata*, species nova (fig. 30). Frutex scandens. Caules ad 4 mm crassi ramique glabri. Folia elliptico-lanceolata attenuato-acuminata apice acuto vel obtuso basi rotundata vel late acuta utrinque glabra penninervia nervis vix prominentibus margine revoluto, laminis 5 x 1.66- 6.5 x 1.9 - 8 x 2.8 cm longis et latis, petiolo sulcato glabro 8 - 11 mm longo. Inflorescentia umbellata axillaris, pedunculo puberulo vel glabrato 1 - 2 cm longo. Pedicelli puberuli vel glabrati gracilies 2 cm longi fructiferi paullo longiores. Sepala triangulari-ovata obtusa glabra in sicco purpurea 1 - 1.5 mm longo. Corolla cremo-alba 1 cm lata extus glabra intus pubescens pilis brevibus crassis ad mediam partem laciniata laciniis triangularibus 3.5 mm longis. Coronae radii parvi extus rotundati intus acuti 1.5 mm longi. Fructus immaturus glabra a *H. chlorantha* foliis longe attenuatis pedunculis et pedicellis et floribus minoribus.

Climbing shrub. Stems to 4 mm thick; stems and branches glabrous. Leaves elliptic- lanceolate, attenuate, apex acute or obtuse, base rounded or broadly acute, glabrous on both sides, pinnately veined, veins hardly prominent, margins revolute; blades 5 x 1.6 - 6.5 x 1.9 - 8 x 2.8 cm long and broad; petiole grooved, glabrous, 8 - 11 mm long. Inflorescence umbellate, axillary; peduncle puberulous or glabrous, 1 - 2 cm long. Pedicels puberulous or glabrous, slender, 2 cm long; fruiting pedicels slightly longer. Sepals triangular-ovate, obtuse, glabrous, in dried condition purple, 1 - 1.5 mm long. Corolla creamy white, 1 cm broad, outside glabrous, inside pubescent with short, thick hairs, lobed to the middle; lobes triangular, 3.5 mm long. Rays of the corona small, outside rounded, inside acute, 1.5 mm long. Immature fruit glabrous, to 9 cm long

attenuate. — * Differs from *H. chlorantha* in its long attenuate leaves, smaller peduncles, pedicels, and flowers.

Savai'i: forests above Letui, altitude 1000 meters, flowers, September 27, 1929, Christophersen no. 759; forest above Matavanu Crater, altitude 1300 meters, flower, young fruit, July 24, 1931, Christophersen and Hume no. 2164, type in B. P. Bishop Museum; forest, Le To, above Salailua, altitude 750 meters, fruit October 21, 1931, Christophersen no. 2896. A slender vine common in the forests of Savai'i at high altitudes. It is recognized by its narrow, long pinnately veined leaves.

* Compilers notation: it also differs in having persistent peduncles.

Herbarium Sheets:

Hoya attenuata Christop.	SamoaMatovanaCrater	Type	2164	1931	Christophersen UC)
Hoya attenuata Christop.	Samoa Letui		759	1929	Christophersen
Hoya attenuata Christop.	Samoa Le To		1617	1974	Whistler (B)
Hoya attenuata Christop.	Samoa Le To		2896	1935	Christophersen

Hoya australis subsp. **tenuipes** (K Hill) P. Forster & D. Liddle

Type Description:

Hoya australis subsp. **tenuipes** (K Hill) P. Forster & D. Liddle, **comb. nov.** *Hoya oligotricha subsp. tenuipes* K. Hill, Telopea 3: 254 (1988). **Type:** Queensland, COOK DISTRICT: Pascoe River Rockpile, 16 September 1978, *B. Wallace* 83252 (holo: NSW n.v.; iso: L n.v.; BR!,K not received).

Gymnema recurvifolium Blume, Mus. Bot. 1: 150 (1850), **synon. nov. Type:** Nov. Guinea, *Zippelius* (holo: [L898168-39, L898168-41] U).

Hoya bicarinata A. Gray, Proc. Am. Acad. Arts Sc. 5: 335 (1862). **Type:** Tonga. Tongatapu, *U.S. Expl.* Exped. [US78372] (lecto: US!; *fide* A. C. Smith, Fl. Fiji 4: 118 (1988)).

Hoya barrackii Horne, A Year in Fiji (1881), nom. nud. *(fide* A. C. Smith, FT Fiji 118 (1988)).

Hoya papillantha Schumann, Notizbl. Bot. Gart. Mus. Berl. 2: 142 (1898), synon. **nov. Type:** "Neu-Lanenburg-Gruppe, Credner-Insel, an einem Starnme vou subcordata", Jul 1896, Dahl 239 (holo: Bt).

Hoya lactea S. Moore, J. Bot. 52: 293 (191 1), **synon. nov. Type:** Papua New Guinea. CENTRAL PROVINCE: Mt Gandada, H. 0. Forbes 872 (syn: BM n.v., photo at BRI!); without locality, *H. A. Forbes 925 (syn: BM n.*v.).

Illustration: Liddle, Hoya in Australia Figs 10 & 11 (1986).

Vine. Foliage glabrous or with scattered to sparse indumentum. Leaf lamina coriaceous, with extra floral nectaries at base; margins not strongly recurved; secondary venation obscure. Fig. 5.

Selected specimens: Irian Jaya. Warnapi, 15 km N of Ransiki, Vogelkop, Sep 1948, Kostermans *271* 5 (L); Cycloop Mtns, road Hollandia - Sentani, Jun 1961, van Roven & Sleurner 5715 (BRI,L). **Papua New Guinea. MADANG PROVINCE: Josephstaal,** 40°45'S, 145'00'E, Sep 1958, White[NGFl0323j(A,BRI,CAN B). NEW BR ITAIN: Bci Massawa, Nov 1901, Schlechter 13707 (WRSL). **BOUGAINVILLE:** Arawa Plantation, 6°15'S, 155°40'E, Dec 1960, Millar [NGF384011 (BRI,CANB,L). **SOUTHERN HIGHLANDS PROVINCE:** Near Moro, Lake Kutubu, 6°22'S, 143°14'E, Oct 1961, Schodde 2445 (A,CANB,L). **MOROBE PROVINCE:** track to Mt Shungol, 6°50'S, 146°45'E, Nov 1970, Stevens AE504891 (A,BRI,CANB,L). **NORTHERN** PROVINCE: Near Ridubidubina camp, Aug 1954, floodland 4509 (A, L). **WESTERN PROVINCE:** Daru Is, 9°07'S, 143°20'E, Aug 1967, Rielsdale [NGF337591 (L). **CENTRAL PROVINCE:** Boridi, Nov 1935, **Carr** 13467 (CANB,L). **MILNE BAY PROVINCE:** Biniguni, Mayu I track, 9°38'S, 149°18'E, Jun 1972, Streirnann & Leach [NGF285791 (BRI,CANB). **Solomon Islands.** San Cristobal, mouth of Muni River, Aug 1965, *Sore* 2331 **(A,L). Australia. Queensland. COOK DISTRICT':** Mulingar, Mcllwraith Range, Apr 1979, Liddle IMI_25:13110; **Lankelly** Ck, 13°53'S, 143°18'E, **Apr** 1979, Liddle IML26, IML27 (BRI); Daintree **Barge,** WITS, 145°24' , **Aug** 1979, Liddle IML3 (BRI); Atherton, 16°34'S, 145°40'E, Apr 1978, Liddle IMLI (BRI). **NORTH KENNEW DISTRICT:** Cull. Indooroopilly (ex plant collected by R. Lockyer at Charmillan Ck, c. 12 km SSW of Ravenshoe, 17°42'S, 145°31'E, Feb 1986), Forster 2380 (BRI). **New Caledonia.** Paita, **Mont Lulu**, Ile Wallis, Dec 1981, McKee 40077 (P). **Fiji.** Vitu **Levu, Sep** 1947, Smith 6256 (BRI); cult. Indooroopilly (ex plant collected by P. Spence on Mana Is), Apr 1986, Forster 2394 (BRI).

Distribution and habitat: This subspecies occurs in Queensland (Map B) on southern Cape York Peninsula south to Innisfail and also in New Guinea, the Solomon Islands and Melanesia. Plants grow in rainforests, vineforests or adjacent to mangroves either as epiphytes or lithophytes.

Phenology: In Australia, the main flowering period is from September to October, although there may be a few flowers present in April or May; fruits appear 3-4 months later.

Notes: The most distinctive features of this subspecies are the more or less glabrous, coriaceous to fleshy foliage, and the slender peduncles. Both characters were recognized by Hill so that our concept of this taxon is similar to his. We consider the taxon also occurs in New Guinea and Melanesia where it has been previously described several times at the specific level. An excellent account of the taxa of this complex of Hoyas described from Melanesia including notes on typification, nomenclature and indumentum development, is given by Smith 1 988). In this, subspecies *tenuipes* appears to be the most frequently collected taxon in that region.

The type collection of *Gymnema recurvifolium* which comprises two sheets, has inflorescences with only very young buds present. Dissection of some of those buds was not particularly informative as to the generic placement of the material as neither the stamina] column nor pollinaria were developed. On the basis of the foliage and racemiform, persistent peduncles this material does not belong to *Gymnema* (soon to be included in *Marsdenia* R. Br. or *Stephanotis* Thouars (cf. Forster 1990a)) and is not referable to any taxon of *Marsdenia* s.l. that occurs in Papuasia (Forster unpubl.). This material is, however, an excellent vegetative match for other collections of *H. australis* subsp. t*enuipes* from Papuasia so we are confident on the inclusion of Blume's taxon within this subspecies.

The lectotype of *H. bicarinata* at US is rather fragmentary. It has glabrous upper leaf surfaces and on the lower leaf surface is glabrous except for scattered indumentum on the midrib.

The type of *H. papillantha* is not extant. However, we have been able to locate a specimen *(Schlechter* 13707) subsequently cited under this name by Schlechter (1905) who compared his material with the type in B. This collection is glabrous and typical of the coriaceous large-leaved plants that have been collected from New Britain, Bougainville and the Solomon Islands.

Conservation status: This subspecies is commonly encountered and is not endangered. Plants are widely cultivated.

Hoya betchei (Schlechter) Whistler

Type Description:

In Botanische Jahrbücher #92 40 (1908) 16. (Beiblatt zu den) Dr. R. Schlechter. **Physostelma Betchei** Schltr. n. sp.; volubile, alte scandens, gracile, ramosum; ramulisque filiformibus elongatis, glabris, laxe foliatis; foliis patulis petiolatis lanceolato-ellipticis acuminatis, basi rotundatis, glabris, textura coriaceis, 6.5 - 9.5 cm longis, medio fere 1.8 - 2.3 cm latis, petiolo carnosulo c. 1 cm longo; cymis graciliter pedunculatis, umbelliformibus paucifloris, pedunculo tereti glabro, 5 - 6 cm longo, pedicillis gracilibus glabris, c. 3.5 cm longis; floribus illis *P. papuani* Schltr. similibus et fere aequimagnis; calycis segmentis ovato-oblongis, 0.2 cm longis; corolla late campanulata usque supra medium 5-lobata c. 1.1 cm longa, lobis triangulo-ovatus obtusis intus, puberulus margine ciliatis, extis glabris; coronae phyllis carnosis superne oblongis breviter rostratis, subtus oblongis, longitudinaliter medio foveatis, dorsum versus paululo adscendentibus; antheris trapezoides, appendice hyalina ovata obtusa coronae phylla antice paululo superante; stigmatis capite conico; polliniis oblique oblongoides, margine exteriore carinato-marginatis, translatoribus perbrevibus, retinaculo rhomboideo, minuto.

Samoa: in den Wäldern höherer Gebirge (E. Betche, blühend im Dezember 1880).

Wohl mit P. papuanum Schltr. verwandt, jedoch durch die dicken Blätter und die innen behaarten Blüten leicht kenntlich. Dieser Vertreter der Gattung scheint von allen der Gattung Hoya am nächsten zu stehen.

Translation: Twining high climber, with slender branches, branched and rebranched, threadlike elongated, flexible, glabrous, loosely leaved, leaves outspread petiolate lanceolate-elliptic, with the base rounded, glabrous, texture leathery, 6.9-9.5 cm long, in the middle 1.8-2.3 cm, petiole fleshy about 1 cm long; cymes slenderly pedunculate shaped like umbels, of few flowers, peduncle round, glabrous, 5-6 cm long; pedicels slender, glabrous, about 3.5 cm long; with flowers similar to those of P. *papuanum* (*H. papuana*) Schlechter, similar and nearly of equal size; with the segments of the calyx ovate-oblong obtuse, 0.2 cm long; corolla broad campanulate, 5 lobed all the way to above the middle, about 1.1 cm long, lobes triangular-ovate obtuse, inside puberulous, margins ciliate, outside glabrous; with the scale of the corona fleshy, above oblong, briefly beaked, below oblong, longitudinally pitted, in the middle , on the back turned a little upward; anthers trapezoidal, appendage hyaline ovate obtuse, with the tip of the corona lobe a little higher; with the stigma head conic, pollinia obliquely oblong, exterior margins with raised (keeled) edges, translators short throughout, retinaculum rhomboid, minute.

Samoa: in the forest of the higher mountains (E. Betche, flowering in December 1880).

No doubt related to *P. papuanum* Schlechter, but easily recognized through the leaves and the flowers which are hairy on the inside. This representative of the Genus appears to be closest of all to the Genus Hoya (subsequently placed in the Hoya Genus).

Other descriptions:

In Botanische Jahrbücher 50 (1913) 127. **Hoya betchei** Schlechter. Mentioned in this publication.

In Phytologia #5 38 (1978) 410. **Hoya betchei** (Schltr.) comb. nova. A climbing vine of the forest, especially in sunny habitats. It is endemic to Samoa. The first valid name for this species appears to be *Physostelma betchei* Schlechter in Engl. Jahrb, XI Beibl. 92:16, 1908. Physostelma is, however, restricted to Southeast Asia. Thus, this species should be moved to the genus Hoya. A purple-flowered variety on Tutuila has been described as *var. tutuilensis* Christophersen, under the name *Hoya chlorantha* Rechinger. This species is synonymous with *Hoya betchei* and this variety is *var. tutuilensis* (Chr,) comb. nov. W2765, W3110.

Editors note: (Chris Burton) It is apparent that *H. chlorantha* and *H. betchei* are not the same species which invalidates the above combination. Physostelma is not confined to SE Asia!

The Asclepiadaceae Works of Friedrich Richard Rudolf Schlechter (1992) 30. A. Nicholas. **H. betchei** Schlechter (Type of *Physostelma betchei* Schlechter) - 15.

In Dr. Schlechter's Hoya Species (1993) 36-37. R. D. Kloppenburg. **Physostelma betchei** Schlechter. *Hoya betchei* Schlechter.

Twining high climber, with slender branches, branched and rebranched, threadlike elongated, flexible, glabrous, loosely leaved, leaves outspread petiolate lanceolate-elliptic, with the base rounded, glabrous, texture leathery, 6.9-9.5 cm long, in the middle 1.8-2.3 cm, petiole fleshy about 1 cm long; cymes slenderly pedunculate shaped like umbels, of few flowers, peduncle round, glabrous, 5-6 cm long; pedicels slender, glabrous, about 3.5 cm long; with flowers similar to those of P. *papuanum* (*H. papuana*) Schlechter, similar and nearly of equal size; with the segments of the calyx ovate-oblong obtuse, 0.2 cm long; corolla broad campanulate, 5 lobed all the way to above the middle, about 1.1 cm long, lobes triangular-ovate obtuse, inside puberulous, margins ciliate, outside glabrous; with the scale of the corona fleshy, above oblong, briefly beaked, below oblong, longitudinally pitted, in the middle, on the back turned a little upward; anthers trapezoidal, appendage hyaline ovate obtuse, with the tip of the corona lobe a little higher; with the stigma head conic, pollinia obliquely oblong, exterior margins with raised (keeled) edges, translators short throughout, retinaculum rhomboid, minute.

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Published by Dr. R. Schlechter in: 1908 Botanische Jahrbücher #92 V.40 p.16 (Beiblatt zu den).

Herbarium Sheets:

Hoya betchei Schltr.	Samoa	Type	1880	Betche (B)
Hoya betchei Schltr.	Samoa	2765		
Hoya betchei Schltr.	Samoa	3110		
Hoya betchei Schltr.	Samoa	445	1906	Vaupel (B)
Hoya betchei Schltr.	Samoa	514	1977	Spence

Hoya chlorantha Rechinger

Type Description:

In Repertorium Specierum Novarum 5 (1908) 131. (Fedde) "Plantae Nova Pacificae II." Dr. K. Rechinger. 16. **Hoya chlorantha** Rechinger, nov. spec.

Caulis scandens, 2 mm (in sicco) diametro, internodia longa, 10 cm et ultra. Folia coriacea, sicca nitida viridia nervis utrinque vix prominulis, breviter petiolata utrinque angustata, acuminata penninervis. Inflorescentia umbelliformis; pedunculus tennuis 5 - 6 cm longus, pedicelli tenues 3—.4 cm longi. Flores magni, segments calycis oblonga lanceolata acuminato-obtusa, corolla magna plana extus glabra, intus. puberula, viridis. Insel Upolu, in Wäldern bei Tiavi hoch auf Bäume kletternd. Mai 1905 (No. 356, Rechinger); Papaseea, Juli 1905 (No.1874 Rechinger).

Stengel dünn, Blätter in trockenem Zustande mässig dick, dünner als bei *H. pubescens* Reineke, elliptisch lanzettlich (10 cm x 2 cm), ausgesprochen fiedernervig, die Sekundärnerven und die niederiger Ordnung bilden ein netzartiges Geflecht, das wie die Sekundärnerven (4—5 jederseits) nur auf der Blattunterseite etwas deutlicher hervortritt. Beim Trocknen rollt sich der Blattrand etwas nach unten. Blattstiel 8—10 mm lang. .Blätter beiderseits glänzend. Blüten in Dolden; gemeinsamer Blütenstiel 5—6 cm lang, Blütenstiele 3—4 cm lang, beide dünn. Die Blütenstiele dieser Art tragen nur einmal Blüten, während die vieler anderer H*oya*-Arten aus dem bleibenden verdickten Doldenstiel mehrere Male nach einander Blüten bilden. Durch diesen Vorgang entsteht eine längliche knotenförmige Verdickung, aus den Narben der abgefallenen Blütenstiele gebildet. Blütenfarbe in lebende Zustande grünlich. Matt (nicht glänzend) getrocknet grün, stark duftend. Blumenkrone radförmig, flach wenig fleischig. Blüten ausgebreitet 17—20 mm, geschlossen 12 mm im Durchmesser. Blütenstand 15—25-blutig, Zipfel der Corolle 7 mm lang. Kelchzipfel lanzettlich am Rande bewimpert, zugespitzt, am Ende stumpf. Die blütentragenden Sprosse entwickeln sich axillar, tragen einige Laubblätter, in der nächsten Vegetationsperiode entsteht axillar aus dem obersten (jüngsten) Blattpaar wieder ein neuer blütentragender Spross.

Translation: Climbing stalk 2 mm in diameter (when dry), long internodes, 10 cm or more. Leaves leathery, when dry shiny green, nerves not prominent on either side, briefly petiolate, narrowly acuminate at both ends, penninerved. Inflorescence umbel-like, peduncles slender 5 - 6 cm long, pedicels slender 3 - 4 cm long. Flowers large, segments of the calyx oblong lanceolate acuminate-obtuse, corolla large, flat, outside glabrous, inside puberulous, green.

On the Island of Upolu, in the forest near Tiavi climbing high up in the trees. May 1905 (No. 356, Rechinger); Papaseea, July 1905 (No. 1874, Rechinger).

Stalk thin, leaves in the dry state, moderately thick, thinner than the near *H. pubescens* Reinecke, elliptic-lanceolate (10 cm x 2 cm), decidedly pinnate, the secondary veins and the lesser nerves form a reticulated network, that like the secondary veins (4 - 5 on each side) only show more clearly on the under side of the leaves. In the dry state, the edges of the leave roll downward. The petiole is 8 - 10 mm long. Leaves are shiny on both sides. Bloom is an umbel; the common peduncle is 3 - 4 cm long, both are thin. The peduncle of this species bears blooms only one time, whereas many other species of Hoya bloom several times from a persistent thickened peduncle. By this process there arises a long node-like swelling formed from the scars of the fallen pedicels. Flower color

in live condition is greenish, matte (not glossy) straw green, with a strong fragrance. Flower crown is radially flat, slightly fleshy. Blooms spread out 17 - 20 mm, closed 12 mm in diameter. Inflorescence of 15 - 25 blooms, corolla lobes 7 mm long. Calyx lanceolate ciliate at the edges, pointed, blunt at the end. The peduncle arise from the axils, bear a few leaves and in the next vegetation period there arises in the axils of the uppermost (youngest) leaf-pair a peduncle arises, once again.

Other descriptions:

In Denkschriften d. Kais. D. Wiss. Math.-Naturw. Klasse Band. (1910) 333-334. "Botanisch-Zoologische Ergebnisse von den Samoainseln" K. Rechinger. **Hoya chlorantha** Rechinger in Fedde, Repert. novar. Species., Bd. V (1908), p. 131. Taf. XII, Fig. 2.

Caulis scandens, 2 mm (in sicco) diametro, internodia longa, 10 cm et ultra. Folia coriacea, sicca nitida viridia nervis utrinque vix prominulis, breviter petiolata utrinque angustata, acuminata penninerved. Inflorescentia umbelliformis; pedunculus tennuis 5 - 6 cm longus, pedicelli tenues 3— 4 cm longi. Flores magni, virides, plani extus glabri, intus puberuli, segmenta calycis oblonga, lanceolata acumonato-obtusa. Insel Upolu, in Wäldern bei Tiavi, hoch auf Bäume kletternd. Mai 1905 Nr. 356. In der Nähe des Wasserfalles Papuaseea, Juli, Nr. 1874.

Stengel dünn, Blätter in trockenem Zustande mäszig dick, dünner als bei *H. upoluensis,* elliptisch lanzettlich (10 x 2 cm), ausgesprochen fiedernervig, die Sekundärnerven und die niedrigen Ordnung bilden ein netzartiges Geflecht, das wie die Sekundärnerven (4 bis 5 jederseits) nur auf der Blattunterseite etwas deutlicher hervortritt. Beim Trocknen rollt sich der Blattrand etwas nach unten. Blattstiel 8—10 mm lang. Blätter beiderseits glänzend. Blüten in Dolden, gemeinsamer Blütenstiel 5 bis 6 cm lang, Blütenstiele 3 bis 4 cm lang, beide dünn. Die Blütenstiele dieser Art tragen nur einmal Blüten, während die vieler anderer Hoya-Arten aus dem bleibenden verdickten Doldenstiel mehrere Male nacheinander Blüten bilden. Durch diesen Vorgang entsteht eine längliche, knotenförmige Verdickung, aus den Narben der abgefallenen Blütenstiele gebildet. Die Blütenfarbe ist in lebendem wie im getrockneten Zustande matt grünlich, die Blüte duftet stark. Die Blumenkrone ist nach, radförmig, wenig fleischig, sie miszt ausgebreitet 17 bis 20 mm, geschlossen 12 mm Durchmesser. Der Blütenstand ist 15- bis 25 blütig, die Zipfel der Corolle sind 7 mm 1ang. Die Kelchzipfel sind lanzettlich, am Rande bewimpert, zugespitzt, das äuszerste Ende ist stumpf. Die blütentragenden Sprosse entwickeln sich axillar, tragen einige Laubbätten in der nächsten Vegetationsperiode entsteht in einer Blattachsel des obersten (jüngsten) Blattpaares wieder ein neuer blütentragender Sprosz.

Translation: Same as 1908 (Fedde) Type description.

In Samoan Flowering Plants, Bishop Museum Bulletin #128 (1935) 187. Christophersen. **Hoya chlorantha** Rechinger: Fedde Rep. Nov. Sp., vol. 5, p. fat, :908.

Savaii: in cracks, Matavanu lava field, altitude 300 meters, September 12, 1929, Christophersen no. 599; edge of Matavanu lava field, altitude 200 meters, flower, September 12, 1929, Christophersen no. 610; edge of forested "island" in Matavanu lava field, altitude 200 meters, flower, July 6, 193t, Christophersen and Hume no. 1870; edge of forest, Le To, above Salailua, altitude 750 meters, flower, October At, 1931, Christophersen no. 2881.

The specimens have been compared with Rechinger's specimen no. 356 from Upolu (in Vienna herbarium). They conform closely in form, venation, and size of the leaves and in the large, pubescent flowers. This species is characterized by its pinnately veined, oblong leaves and its large, greenish-yellow flowers, pubescent inside, not red in the center. The lobes of the corona are narrow, 4 mm long, the outer end rounded.

Hoya chlorantha Rechinger varietas **tutuilensis**

Type description:

Hoya chlorantha Rechinger varietas **tutuilensis**, varietas nova (fig. 31).

Differt a typo floribus rubidis coronae radiis brevioribus ovalibus 2.5 mm longis.

Differs from the type in its reddish flowers, and its shorter, oval, 2.5 mm long rays of corona.

Tutuila: forest, Papatele Ridge, altitude 300 meters, flower, October 31, 1929, Christophersen no. 1011, type in B. P. Bishop Museum; scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen no. 3S62 (?).

This variety, found on the slopes and top of Le Pioa on Tutuila, differs from the type of the species in its reddish flowers and shorter, oval lobes of the corona. The specimen from the top of Le Pioa is sterile, agreeing in characters of the leaf with the type of the variety.

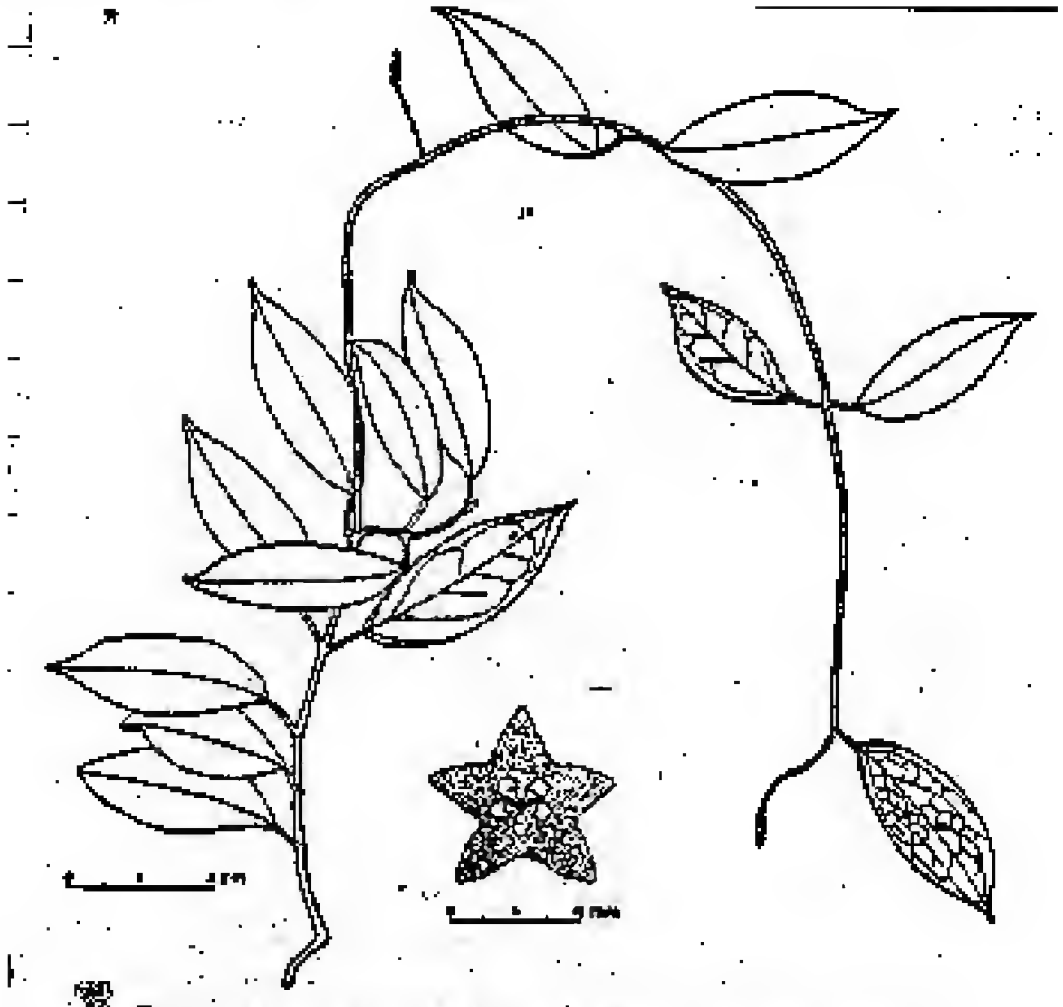


FIGURE 31.—Branch and flower, *Hoya chlorantha* varietas *tutuilensis*.

Drawing from the above publication.

Measurements from flowers collected at Ted Green's 9/8/00.

Pedicel: very long and thin, terete, glabrous; at least 3 cm long, 0.08 cm in diameter.

Calyx: small 1/2 way to sinus, outside glabrous, cupped on inner surface, a few cilia, no ligules. Diameter 0.70 cm 0.29 cm long; base 0.14 cm wide.

Ovaries: domed constricted near apex. 0.15 cm tall, base of pair 0.13 cm wide

Corolla: outside glabrous but finely granulose, sub-campanulate, inside finely pubescent.

Sinus to sinus	0.09 cm
Sinus to center	0.47 cm
Sinus to apex	0.61 cm so cut well below 1/2 way.
Apex to center	0.93 cm flattened, so diameter of flower is 1.86 cm
Widest	0.59 cm

Corona: raised in center and spatulate, does not cover center; outside raised. Column 0.05 cm tall. Scales channeled below with overlap, finely sulcate linearly, anther wings narrow (thin) and sharp, extended. Scale does not reach sinus. Outer scale apex rounded narrowly and pitted.

Apex to apex	0.33 cm
Apex to center	0.36 cm
Widest	0.18 cm
Ret. to ret.	0.10 cm
Aw. to aw.	0.21 cm
Center to Aw.	0.20 cm
Ret. to aw.	0.11 cm

Herbarium Sheet:

Hoya chlorantha	Rechinger	Samoa	Upolu Tiavi	Type	356	1905 Rechinger
Hoya chlorantha	Rechinger	Samoa		Type	1011	(Var.tutuilensis)
Hoya chlorantha	Rechinger	Samoa			3562	
Hoya chlorantha	Rechinger	Samoa			2881	Christoph.
Hoya chlorantha	Rechinger	Samoa	Papiseea		1874	1905 Rechinger
Hoya chlorantha	Rechinger	Samoa	MontavuanuLava		1870	1931 Hume (UC)
Hoya chlorantha	Rechinger	Samoa			511	1977 Spence

Hoya filiformis Rechinger

Type Description:

In Repertorium Specierum Novarum 5 (1908) 132. K. Rechinger. 17. **Hoya filiformis** Rechinger, nov. spec. Caule scandente tenui, filiformi (in sicco 1— 2 mm diametro) glaberrimo ut tota planta), foliis omnibus oppositis geminis, tenuibus penninerviis, lanceolato-ovatis, acuminatis, acumine prostrato. Foliis tenuibus plane reticulato-venosis, glaberrimis lucidis. Inflorescentiis umbelliformibus, pedunculo brevi gracili axillari 7 — 8 mm longo, pedicellis tenuissimis pedunculo aequilongis. Floribus minutis albis glabris, calycis lanciniis minutissimis lanceolatis acuminatis. Lobis corollae e basi lata obtuse angustatis planis. Fructibus maturis 13 — 14 cm longis.

Samoa Insel Upolu, in grosser Menge im Kammgebiete ober Utumapu auf neideren Bäumen. Juli 1905 (No. 924, 1500, 1701 Rechinger).

Blattextur dünn, Blätter onhe Blattstiel 6 cm lang, 2 cm breit, davon entfällt auf die Träufelspitze nahezu 1 cm Blattstiel 8 mm long. Blätter zart aber doch deutlich fiedernervig, die Nerven sind auf der Blattoberund Unterseite sichtbar, das der Blattbasis zunächst aus dem Medianus entspringende Nervenpaar ist fast bis über die Mitte des Blattes hinaus randläufig. Blüten weiss, wenig duftend, denen der *H. pycnophylla* mihi ähnlich, aber noch kleiner. Blüttendolden etwa 2 cm im Durchmesser.

Bemerkenswert durch die langausgezogenen Spitzen der Laubblätter und denen dünne Textur. Die ganze Pflanze ist volkommen kahl.

Translation: A thin stemmed climbing plant, threadlike (in the dry state 1 - 2 mm in diameter) the total plant glabrous, leaves entire in opposite pairs, thin penninerved, lanceolate-ovate, acuminate, acumen procumbent. Leaves thin visibly reticulate veined, very glabrous bright. Inflorescence like an umbel, peduncle short, glabrous axillary 7 — 8 mm long, pedicels very thin of equal length to the peduncle. Flowers small white, glabrous, calyx lobes very small lanceolate acuminate. Lobes of the corolla broad at the base, obtuse narrowly flat. Fruit at maturity 13 — 14 cm long.

Island of Upolu, Samoa, in great quantity in the Hill Region above Utumapu on the low trees. June 1905 #924, 1500 and 1701 Rechinger.

Leaf texture thin, leaf exclusive of the petiole 6 cm long, 2 cm wide, 1 cm near the tapered point turns down. Petioles 8 mm long. Leaves are delicately feather nerved, nevertheless the nerves are distinct on the upper surface and visible on the lower surface, first of all from the median of the leafbases extend outward in pairs almost to the edge of the leaf. Flowers white, not much scent, and to me much like those of *H. pycnophylla* but yet smaller. The umbel is 2 cm in diameter.

Noteworthy through the long twisted apex of the leafblade and the fine thin

texture. The entire plant is completely bald.

Other Descriptions:

In Denkschriften d. kais Akad. d. Wiss Math-Natur. 75 (1908) 334. K. Rechinger. "Botanisch-Zoologische Ergebnisse von den Samoainseln". * **Hoya filiformis** Rechinger in Fedde, Repert. novar. specier., Bd. V, p. 132 (1908). Caule scandente tenui, filiformi (in sicco 1 —2 mm diametro) glaberrimo ut tota planta, foliis omnibus oppositis geminis, tenuibus penninerviis, lanceolato-ovatis, acuminatis, acumine prostrato, tenuibus, plane foliis omnibus oppositis geminis, tenuibus penninerviis, lanceolato-ovatis, acuminatis, acumine prostrato, tenuibus plane reticulato-venosis, glaberrimis lucidis. Inflorescentiis umbelliformibus, pedunculo brevi gracili axillari 7 — 8 mm longo, pedicellis tenuissimis pedunculo aequilongis. Floribus minutis albis glabris, calycis lanciniis minutissimis lanceolatis acuminatis. Lobis corollae e basi lata obtuse angustatis planis. Fructibus minutis albis glabris, calycis laciniis minutissimis lanceolatis acuminatis Lobis corollae basi lata obtuse angustatis planis. Fructibus maturis 13 — 14 cm longis.

Insel Upolu: In groszer Menge auf dem Kammgebiet ober Utumapu auf neideren Baümen. Juni, Nr. 924, 1500, 1701.

Blattextur dünn, Blattlamina 6 cm lang, 2 cm breit, davon entfällt auf die Träufelspitze nahezu 1 cm Blattstiel 8 mm long. Blätter zart aber doch deutlich fiedernervig, die Nerven sind auf der Blattober-und-unterseite sichtbar, das der Blattbasis zunächst aus dem Medianus entspringende Nervenpaar ist fast bis über die Mitte des Blattes hinaus randläufig. Die Blüten sind weiss, wenig duftend, denen der *H. pycnophylla* Rechinger ähnlich, aber noch kleiner. Die Blüttendolden etwa 2 cm im Durchmesser.

Ausgezeichnet durch die langausgezogenen Spitzen der Laubblätter und durch dünne Texture. Die ganze Pflanze is vollkemmen kahl.

Translation: Almost identical to the above:

Herbarium Sheets:

Hoya filiformis	Rechinger	Samoa, Savai'i	759	BISH	Christophersen
Hoya filiformis	Rech.	Samoa, Upolu	1700	W	Rechinger
Hoya filiformis	Rech.	Samoa	211	K	P
Hoya filiformis	Rech.	Samoa	1701		Rechinger
Hoya filiformis	Rech.	Samoa, Upolu	1500	W	Rechinger
Hoya filiformis	Rech.	Samoa, Savai'i	608	BISH	Christophersen
Hoya filiformis	Rech.	Samoa, Savai'i	2164	BISH	Christophersen
Hoya filiformis	Rech.	Samoa, Upolu	1106	UHAW	Whistler
Hoya filiformis	Rech.	Samoa, Upolu	3411	G	Hoech.
Hoya filiformis	Rech	Samoa, Upolu	2015	UHAW	Whistler
Hoya filiformis	Rech.	Samoa, Upolu	1617	UHAW	Whistler
Hoya filiformis	Rech.	Samoa Upolu Lk. Lanuto	3311	G	Hochr.
Hoya filiformis	Rech.	Samoa	30	K	P

Hoya filiformis Rech.	Samoa, Upolu	* Type	925	1905	Rechinger
Hoya filiformis Rech.	Samoa, Upolu		996		(W)

*** No type was designated so I have here selected one sheet as the type. (RDK).**

Hoya pubescens Reinecke

Type Description:

In Botanische Jahrbücher 25 (1893) 669. "Die Flora der Samoa-Inseln" Reinecke**. H. pubescens** Reinecke n. sp.; caulis scandentis, volubilis internodiis longis; ramulis pubescentibus; foliis carnoso-coriaceis, planis, penninerviis, ovalibus vel ovatis, brevissime abrupte acuminatis, basi rotundatis vel subcordatis, petiolis longis, pubescentibus, lamina utrinque minute lanata; inflorescentiis axillaribus, multifloris pedunculo pedicellis subaequali; calycis laciniis lanceolatis, longe acuminatis, extus pubescentibus; corollae lobis e basi late obtuse angustatis, planis, extus glabris, intus hirtellis; disco evoluto; coronae stamineae foliolis incrassatis, marginibus haud revolutis, dorso eximie bicarinatis; folliculis longis, acuminatis, ceraceo-pruinosis.

Stengel bis 15 mm dick; Internodien ca. 1 dcm, Blattstiele 2—3 cm, Spreiten 6—9 cm lang, 4—6 cm breit; Dolden- und Blütenstiele ca. 3 cm; kelchzipfel ca. 3 mm lang, an der Basis 1.5 mm breit; Krone 15—18 mm im Querdurchmesser, kronzipfel an der Basis 5 mm breit; Follikel l0—14 cm lang, ca. 3 cm dick. Blüten wachsartig.

Im Küstenbusch sehr verbreitet, besonders an Waldrändern und Flussläufen. Weniger aromatisch.

Upolu, Savaii (n. 220).

Einheim. Name: "fue se le lea," Winde, die der Sonne trotzte, weil die Blätter äuszerst schwer trocknen und absterben.

Verwendung: Auch zur Parfümierung; des Cocosöls, besonders aber zu Halsketten. Diese Pflanze, welche von der U. S. Expl. Exped. bereits auf Samoa gefunden, aber von A. Gray *zu H. bicarinata* A. Gray gestellt wurde, urilerscheidet sich doch von dieser derartig, dass sie als selbständige Art zu betrachten ist. Die dickfleischigen, beiderseits behaarten Blätter, die lanzettlichen, stark behaarten Kelchzipfel und die Form der Kronlappen trennen sie scharf von der folgenden *H. bicarinata.*

H. bicarinata A. Gray Proceed. Am. Acad. V (1861/62) 335. — Seem. 163.—Drake d. Cast 236. Upolu: Letogo-Flussgebiet, Jan.1894 (n. 224). Einheim.

Name: Verwendung: wie vorige. Verbr.: Pacifische Inseln, Australien. Das Material ist bis auf einen Laubtrieb auf dem Transport zertürt werden, so dass die Zugehorigkeit zur Art nur vermutungsweise zu bestimmen ist.

Translation: *Hoya pubescens* Reinecke new species; stalk climbing, twining internodes long; branches pubescent; leaves fleshy-coriaceous, flat, penninerved, oval or ovate, very shortly and abruptly acuminate, bases rounded, or somewhat cordate, petiole long, pubescent, blades on both sides shortly lanate; inflorescence axillary, many flowered, peduncle and pedicels almost equal; Calyx lobes lanceolate, long acuminate, outside pubescent; lobes of the corolla at bases broadly obtuse narrowing, flat, outside glabrous, inside hairy; disc unrolled; leaflets of the staminal corona thickened, margins not at all revolute, back two keeled; follicles long, acuminate, horny-pruinose. Stem up to 15 mm thick; Internodes about 1/10 cm, petiole 2 to 3 cm eaves spreading, 6 to 9 cm long and 4 to 6 cm wide; umbels and peduncles about 3 cm Leaves of calyx about 3 mm long, at the base 4.5 mm wide; corolla 15 to 18 mm in diameter, lobes of corolla at the base 5 mm wide; follicle 10 to 14 cm long, about 1 cm thick. Blooms wax-like. Very wide spread in coastal thickets, especially at the edges of forests and near rivers. Less fragrant. Upolu, Savaii (#220).

Local name: "fue se le la", which means “Bindweed which defies the sun”, since the leaves scarcely dry out and die off.

Use: also for fragrance in coco-oil, and especially in necklaces.

This plant, which was already found by the U.S. Exploration Expedition on Samoa, but was listed by A. Gray, as *H. bicarinata* A. Gray, is different from the latter in that it is considered an individual species. The thick fleshy leaves, tomentose on both sides, the lanceolate, heavily tomentose lobes of the calyx, and the form of the crown lobes sharply differ from *H. bicarinata.*

H. bicarinata, A. Gray, Proceed. Am. Aced. V. (1861/62) 335. Seem. 163...Drake d. Cast. #236.

Upolu: Letogo Riverbasin, Jan. 1894 (#224). Native name & uses: as above. It lives on Pacific Islands and Australia.

The material was destroyed in transit but for 1 branch so that the identity of genus or species can only be determined with conjecture.

Other Descriptions:

In Denkschiften d. kais. Akad. D. Wiss. Math.-naturw. Klesse 75 (1910) 333. (Samoa) K. Rechinger. **Hoya pubescens** Reinecke, Sam., in Engl. Bot. Jahrb., Bd. 25 (1893), p. 669. Textfig. 21. Insel Upolu: Fluszufer des Vaisingano bei Malifa, auf Bäumen; Motootua; Bei Utumapu, Nr 1533, 1667; Bei Laulii, Nr. 996; Bei Tiavi, Nr. 379. Insel Savaii: In trockenerem Waldgebiete zwischen Aopo und Sassinn. Stimmt vollkommen mit Originalexemplaren Reinecke's überein

Translation: In the driest Forests here between Aopo and Sassinn. Is perfectly correct with the original example in Reinecke's over-one.

In Plants of Samoa (1972) 41. B. E. V. Parham. Fue Se Le La (R"670). *Hoya australis* R.Br. ex Traill, (Asclepiadaceae) **Hoya pubescens** Rein.

Epiphytic. climbing shrubs; leaves opposite, fleshy or coriaceous; flowers in umbel-like racemes, sweet-scented, and used for perfuming coconut oil; fruit a follicle, seeds surrounded with silky hairs; Reinecke translates the Samoan name "Winde die der Sonne trotzt", i.e. "Twines as the sun runs". Wild hoya.

Herbarium Sheets:

Hoya pubescens Reinecke	Samoa Upolu	1533		
Hoya pubescens Reinecke	Samoa		1867	Chris./Hume
Hoya pubescens Reinecke	Samoa Upolu	379		
Hoya pubescens Reinecke	Samoa	536		Garber
Hoya pubescens Reinecke	Samoa Upolu	996		
Hoya pubescens Reinecke	Samoa Upolu	Type 220		Reinecke
Hoya pubescens Reinecke	Samoa Upolu	1667		
Hoya pubescens Reinecke	Samoa Upolu	319		Seemann
Hoya pubescens Reinecke	Samoa Upolu	163		Seemann
Hoya pubescens Reinecke	Samoa	1970		Chris./Hume
Hoya pubescens Reinecke	Samoa	1973		Chris./Hume
Hoya pubescens Reinecke	Samoa	589		Christ.
Hoya pubescens Reinecke	Samoa Upolu	566		Graber
Hoya pubescens Reinecke	Samoa	917		Christ.
Hoya pubescens Reinecke	Samoa	1973		Chris./Hume
Hoya pubescens Reinecke	Samoa	615		Garber
Hoya pubescens Reinecke	Samoa	1942		Chris./Hume
Hoya pubescens Reinecke	Samoa	236		Castst.
Hoya pubescens Reinecke	Samoa	1869		Chris./Hume

Hoya pycnophylla Rechinger

Type Description:

In Repertorium Specierum Novarum 5 (1908) 133. (Fedde) Rechinger. 18. **Hoya pycnophylla** Rechinger, nov. spec.

Caulis longe scandens, internodia longa. Folia crasse coriacea, margine (in sicco) haud vel vix revoluta, opaca, conspicue quintuplinervia, nervi utrinque manifeste prominentes, breve petiolata. Petiolus 1 cm longus. Inflorescentia umbelliformis, pedunculo crasso persistenti 5 - 6 cm longus, pedicelli graciles ca. 16 mm longi. Flores parvi glabri. Segmenta calycis oblonga rotundata apice acuminata glabra. Corolla parva glabra alba.

Samoa, Insel Upolu, in Wäldern bei Laulii, Mai 1905 (No. 468, Rechinger).
Hochkletternde Schlingpflanze, von *H. Upolensis** Reinecke hauptsächlich verschieden durch viel kleinere, schmälere Laubblätter (9—10 cm X 2—3 cm), ferner durch viel kleinere Blüten. Blätter stets zu zweien gegenständig. Durchmesser der Blüten mit flach ausgebreiteten Corollen (in trockenem Zustande) höchstens 9—10 mm, in geschlossenem Zustande 6 mm Kelchzipfel 1.5 mm lang. Dolden reichblütig, ca. 20-blütig, Blüten wohlriechend glänzend weiss.

* Note: spelling incorrect.

Translation: Stems long climbing, with long internodes. Leaves thick leathery, margines (when dry) not at all or barely revolute, opaque conspicuously 5 tuplinerved, nerves prominently visible on both sides, shortly petioled. Petioles 1 cm long, inflorescence umbel-like, peduncle thick, persistent 5-6 cm long. Pedicels slender, about 16 mm long. Flowers small glabrous. Segments of the calyx oblong with rounded apex acuminate glabrous. Corolla small white glabrous.

Samoa, Island of Upolu, in forests near by Laulii, May 1905 (number 468, Rechinger). Tall climbing twining plant near *H. upoluensis* Reinecke principal difference being a great deal smaller with narrower leaves 9 to 10 cm by 2 to 3 cm, and furthermore by the much smaller blooms. Leaves always in opposite pairs, opposite. Diameter of the blooms when flattened and extending the corolla (in the dried state) at most 9 to 10 mm In closed state 6 mm Calyx lobes 1.5 mm long. Umbels having about 20 blooms. Blossom s fragrant, glossy white.

Other Literature:

In Denkschriften d. kais. Akad. D. Wiss. Math-naturw. Klasse, Band 85 (1910) 336. "Botanische-zoologiche Ergebnisse von den Samoainseln" K. Rechinger. * **Hoya pycnophylla** Rechinger in Fedde, Repert. novar. specier., Bd. V, p. 133 (1908). Taf. XII, Fig. 1.

Caulis longe scandens, internodia longa. Folia crasse coriacea, margine (in sicco) haud vel vix revoluta, opaca, conspicue quintuplinervia, breve petiolata, nervi utrinque manifeste prominentes. Petiolus 1 cm longus. Inflorescentia umbelliformis, pedunculo crasso persistenti. Pedunculus 5 - 6 cm longus, pedicelli graciles circa 15 mm longi. Flores parvi, glabri albi. Segmenta calycis oblonga rotundata apice acuminate glabra.
Insel Upolu: Auf Bäumen in Waldern bei Laulii, Mai, Nr. 468.

Hochkletternde Schlingpflanze, von *H. upoluensis* Reinecke augenfällig verschieden durch viel kleinere, schmälere Laubblätter (9 bis 10 cm X 2 bis 3 cm), ferner durch viel kleinere Blüten. Blätter stets zu zweien, gegenständig. Durchmesser der Blüten mit flach ausgebreiteten Korollen (in trockenem Zustande) höchstens 9 bis 10 mm, in geschlossenem Zustande 6 mm Kelchzipfel 1.5 lang. Dolden reichblütig, zirka 20 blütig, Blüten wohlriechend, rein Weisz.

Translation: See Type description above by Rechinger.

In Bishop Museum Bulletin 128 (1935) 187. Christophersen.? **Hoya pycnophylla** Rechinger: Fedde Rep. Nov. Sp., vol. 5, p. 133, 1908.

Savaii: forest, Salailua, altitude 100 meters, flower, September 15, 1931, Christophersen no. 2605; forest, Papa-Fangalele, altitude 10 meters flower, November 21, 1931, Christophersen no. 3409.

This species is closely related to *H. samoensis* Seemann, differing in the narrower leaves (Which are prominently 5-nerved) and slightly smaller flowers. The specimens in Bernice P. Bishop Museum differ from the original description in their slightly larger flowers.

Herbarium Sheets:

Hoya pycnophylla Reich.	Samoa, Upolu	Type	468	1905 Rechinger
Hoya pycnophylla Reich.	Samoa		3409	1931 Christopher
Hoya pycnophylla Reich.	Samoa		2605	1931 Christopher

Hoya samoensis Seemann

Type Description:

In Flora Vitiensis (1866) 163. B. Seemann. A very distinct looking Hoya has recently been discovered in the Samoan group, viz. **H. Samoensis** (sp. nov.), Seem.; scandens, glabra; foliis ovato-ellipticis acuminatis 5-tuplinerviis, nervis utrinque prominulis; corollae lobes extus glabris, intus puberulis. Nomen vernacular Sameness, "O-le-Fua-dele-la."— Samoan Islands (Powell ! in Herb. Hook.).

Translation: climbing, glabrous; leaves ovate-elliptic acuminate 5-tuplinerved, nerves prominent on both sides; Lobes of the corolla glabrous outside, puberulous inside. Native name in Samoan is.....

Other Literature:

In Bishop Museum Bulletin #128 (1935) 190-191. "Samoan Flowering Plants" Christophersen. **Hoya samoensis** Seemann: Fl. Vit. P. 163, 1866.

Ofu: top of Tumu mountain, altitude 450 meters, flower, September 3, 1925, Garber no. 1116. Tutuila: forest, Papatele Ridge, altitude 300 meters, flower, October 31, I929, Christophersen no. 1007. Upolu: forest, Malolo-lelei-Lanutoo, altitude 700 meters, August 21-22, l929 Christophersen no.370 (?). Savaii: plantation above Tanga, altitude less than 100 meters, flower, October 10, 1929, Christophersen no. 916; forest, Le To,

above Salailua, altitude 750 meters, flower, October 21, 1931, Christophersen no. 2899. A description of the specimen from Tanga (no. 916) is here given.

Climbing shrub with glabrous stem to 3 mm in diameter; branches glabrous. Leaves elliptic-ovate, acuminate, the base broadly cuneate or rounded, glabrous, leathery , when dry, prominently 5-veined; leaf blades 7-10 cm long, 3.5-5.8 cm wide; petioles about 1 cm long, thick, glabrous. Inflorescence umbellate on thick, glabrous peduncles 5.5 - 6.5 cm long; pedicels slender, glabrous, 1.5-2 cm long; calyx glabrous or glabrate; sepals 5, obtuse or acute, 1.5-2 mm long, 1-1.5 mm broad; corolla glabrous on the outside, pubescent on the inner surface, 10-12 mm broad unfolded, divided to the middle into 5 triangular, acute lobes; lobes of the corona concave, ovate- elliptic, both ends acute, glabrous, shiny, 3.5-4 mm long, 1.5- 2 mm broad.

The specimens have been compared with the type in Kew Herbarium, showing good agreement. The leaves of the type are ovate, acuminate, rounded at base, the lobes of the corolla are pubescent on the inside, and the lobes of the corona are long and acute.

Herbarium Sheets:

		altitude		
Hoya samoensis Seem.	Samoa	450m1116	1925	Garber
Hoya samoensis Seem.	Samoa	100m 370		Christ.
Hoya samoensis Seem.	Samoa			Seemann
Hoya samoensis Seem.	Samoa	750m 916	1929	Christopher
Hoya samoensis Seem.	Samoa	700m 1007	1929	Christopher
Hoya samoensis Seem.	Samoa	200m 1297	1974	Whistler
Hoya samoensis Seem.	Samoa	2899	1931	Christ.

Hoya upoluensis Reinecke

Type Description:

In Botanische Jahrbücher 25 (1893-94) 669. "Die Flora der Samoa-Isln." Reineke **H. upoluensis** Reinecke n. sp.; caule scandens, internodiis longis; foliis coriaceis, siceis chartaceis, breviter petiolatis, saepe obliques, elliptico-lanceolatis distincte acuminatis, basi angustatis, conspicue quintuplinerviis, nervis utrinque prominulis; inflorescentia umbelliformi, pedunculo petiolum multo superante; pedicellis tenuibus, quam pedunculus brevioribus; floribus permagnis; calycis segmentis oblongis, angusto-rotundatis, glaberrimis; corolla magna, glaberrima, tubo brevissimo, lobis latis, in apicem longam productis; laminis antheriferis oblongis, loculis sublinearibus.

Hoch steigende Schilngpflanze. Stengel bis 5 mm dick, Internodien regelmäszig, 1 dcm, Blattstiel 25 mm, Blätter 7—15 cm lang, bis 5 cm breit. Doldenstiel 8—5 cm, Blütenstiel 2-2 ½ cm 1ang; Kelchlappen 2—2 ½ mm lang, Krone 12—15 mm im Quer-

durchmesser. Zipfel der Staminalcorolla bis 5 mm lang, in der Mitte ca.2 mm breit. Dolden reichblütig; Blüten wachsweisz, glänzend, sehr wohlriechend mit purpurrotem Narbenkopf.

Vorzugsweise im jüngeren Busch und an Flussläufen. Upolu: Mulifanua-Busch, Oct. 1893 (n. 86).

Einheim. Name: fue manogi, d. h. wohlriechende Kletterpflanze. Verwendung: Die duftenden Blüten dienen zur Parfümierung des Cocosdö1s. Vielleicht hat Seemann, Fl. Vit. 163 unter *H. samoensis* Seem. ex Herb. Hook. dieselbe Pflanze gemeint. Die an und für sich unzulängliche Diagnose daselbst stimmt jedoch einerseits bezüglich der Blattform, andererseits in der Behaarung der Blüten nicht mit der vorliegenden Art überein. Erstere nennt er ovato ellipticis, letztere intus puberulis.; allein in dieser Beziehung gleicht Seemann's Pflanze der folgenden Art.

forma minor.

Im Habitus der Art sehr ähnlich, doch immerhin nicht unerheblich unterschieden durch die Blattstellung und Umbildung je eines Blattes in eine Haftwurzel oder Ranke. Die Blüten (noch nicht aufgeblüht) sind zarter und von Natur gelblich; die Klemmkörper sind in der Blüte als dunkelrote Knöpfehen erkennbar.

Savaii: Centralgebiet, 1000 m, Sept.1894 (n. 446).

Es ist nicht ausgegechlossen, vielleicht wahrscheinlich, das die Form eine selbst-ständige Art darstellt, die aufzustellen indessen das mangelhafte Material nicht angebracht erscheinen lässt.

Translation: stems climbing, with long internodes; leaves leathery, when dry papery, briefly petiolate , often oblique, elliptic- lanceolate, distantly acuminate, narrow based, definitely quintuple nerved, nerves prominent on both sides; inflorescence umbel-shaped, peduncles many times longer than the petiole; pedicels slender, shorter than the peduncles, flowers fairly large; calyx segments oblong, narrowly rounded very glabrous; corolla large, very glabrous, tube very short, lobes broad, with long apex; flaps of the anthers oblong; locules somewhat linear.

A high climbing vine. Stalk 5 mm thick, internodes regularly 10 cm, pedicel 25 mm, leaf up to 7 to 15 cm long, up to 5 cm wide. Peduncle 3 to 5 cm, pedicels 2 to 2.5 cm long; sepal lobes 2 to 2.5 mm long, corona 12 to 15 mm in diameter. The tip of the staminal corolla (corona) is 5mm long, in the middle about 2 mm wide. The umbel with many flowers. Blooms waxy-white, glossy, very fragrant with purple center. Preferable in the jungle thickets and near water courses.

Upolu: Mulifanua-thicket, October 1893 (N. 86).

Local name: fue manogi, d. h. odorous climbing plant. Application: The fragrant blooms are used for the perfuming of coconut oil.

Perhaps has Seemann, Fl. Vit. 163 under *H. samoensis* Seem. ex Hooker meant the same plant. That on and of itself inadequate diagnosis there is correct with respect to the leaf-form on the one hand however, on the other hand the pubescence of the blooms are not in agreement with the present type. Firstly he calls it ovato ellipticis, latter inside puberulous; alone in this relationship is like Seemann's plant of the following type.

forma minor.

In the habitus of the type very similar, however after all not insignificantly ever distinguished through the leaf-position and reformation of a leaf into a holding-root tendril. The flowers (not yet opened) are delicately and from nature yellowish; the hard holdfasts are recognizable in the bloom as a dark red button.

Savaii: Centralgebiet, 1000 meters, Sept. 1894 (n.446).

It is not ausgegechlossen, maybe probably, that the form represents a self-continuous type, to say, meanwhile that the material is defective appearing not to be placed properly.

Other Descriptions:

In Denkschriften d. kais. Akad. D. wiss. Math.-naturw, 85 (1910) 334. K. Rechinger "Botanische Ergebnisse von der Samoainseln". **H. upoluensis** Reinecke, Sam., p. 669) Var. **minor** (Reinecke, l. c., p. 869) Rechinger.

Insel Upolu: Im Kammgebiete bei Tiavi, zirka 600 m s. m., Nr. 1351. Kammgebiet des Lanutoo, Nr. 1830.

Blätter im getrockneten Zustande fast papierdünn, stets deutlich fünfnervig, häufig wird eines der beiden gegenständigen Blätter durch eine Haftwurzel ersetzt. Junge Blätter am Rande bewimpert. In allen Teilen kleiner als die typische *H. upoluensis* Reinecke.

Translation: "A botanical find from the Samoa's"..... Island of Upolu: In the ridge district near Tiavi, about 600 meters altitude # 1351. In the ridge district of Lanutoo, # 1830.

In The Bulletin of the Lloyd Library 33 (1934) 92-93. "Flora of Samoa" C. G. Lloyd & W. H. Aiken". Hoya.— There are two very distinct forms of Hoya which we noticed as occurring on the island. The hoya has twining stems which throw out roots at the lower nodes, the leaves are opposite thick and fleshy, and the flowers are borne in lateral umbels; the corolla is rotate, the 5 lobes of the limb are ovate and validate in the bud. The staminal corona consists of 5 scales inserted on the gynostegium and usually spreading horizontally like a star in the center of the corolla; the inner angle bears a small tooth incumbent on the anther; the pollen masses are erect; the follicles are smooth or with winged like appendages.

Hoya upoluensis.— Stem climbing, internodes about 4 inches long as a rule; leaves coriaceous 1 ¼ -3 inches long by 1 inch wide, of dry papery consistency, rather oblique, elliptic-lanceolate, distinctly acuminate, base narrow, conspicuously 5 nerved; petiole 1 inch, inflorescence umbelliform; umbel stalk from 1-2 inches; flower stalks a little shorter; calyx small the crown about ½ inch in transverse diameter, calyx segments oblong, narrowly rotund, glabrous Corolla large, glabrous, tube short, broadly lobed, long drawn out at the apex; the membrane terminating the anthers oblong, cavity of the anther sublinear. The plant blooms rarely.

In Plants of Samoa (1972) 39. B. E. V. Parham. FUE MANOGI (R"669) **Hoya upoluensis** Rein., (Asclepiadaceae).

Epiphytic vine, with thick, fleshy, oral leaves and clusters of sweet-scented, cream-coloured flowers, Upolu hoya.

Herbarium Sheets:

Hoya upoluensis Reinecke	Samoa , Sawaii		446	1894
Hoya upoluensis Reinecke	Samoa Upolu Tiavi		1351	1910
Hoya upoluensis Reinecke	Samoa	Type	18767	
Hoya upoluensis Reinecke	Samoa Upolu Lanutoo		1830	1910
Hoya upoluensis Reinecke	Samoa Upolu		86	1893

Dr. Art Whistler of University of Hawaii Presented the following on the Hoya's of Samoa. He has lumped all the 3-5 veined species under *Hoya potsii*. *Hoya chlorantha* under *Hoya betchei*, and *Hoya attenuata* under *Hoya filiformis*.

Asclepiadaceae

Hoya

Key to Species

1. Leaves palmately 3-5 veined from the base.....(1) **H. pottsii**
1. Leaves pinnately veined.
    2. Leaves succulent, ovate to oval in shape, flowers red inside at base .....(2) **H. australis**
    2. Leaves mostly succulent, lanceolate to ovate with tip often attenuate, flowers not red inside at base
    3. Flowers 16-28 mm across, pedicel 25-45 mm long, white or maroon in color.....(3) **H. betchei**
    4. Flowers 9-13 mm across, pedicels 15-25 mm long, white in color.....(4) **H. filiformis**

1. **Hoya potsii** Traill.

H. pycnophylla Rech.
H. upoluensis Rein.
H. samoensis Seem.

Type locality: Hainan Island
Distribution: China eastward to Samoa

Savai'i: W 1024 (UHAW), W 1045 (UAHW), W 1237 (UAHW), B 2153 (BISH), C 916 (BISH), C 2605 (BISH, K), C 2899 (BISH), C 3409 (BISH), W 513 (M).
Bpolu: W 206 (UHAW), W 1507 (UHAW), C 370 (BISH), K 468 (W), K 1351 W), K 1830 (W), R 86 (G).
Tutuila: W 1460, (UHAW), L 1985 (UHAW), Me 16769 (M), C 1007 (BISH)
Manu'a: W 1297 (UHAW), Y 9379 (UHAW), Ha 123 (BISH), Ma 262 (BISH), G 1116 (BISH)
Sin Loc: P 31 (K). P 32 (K), P 33 (K), P 255 (K), P s.n. (K) USEE s.n. (US?)
Not seen: R 446 (Savai'i)

Reinecke described H. upoluensis as a "high-climbing vine. Stem up to 5 mm thick, internodes regular, 10 cm long, Petiole 2.5 cm long. Leaves 7-15 cm long, up to 5 cm wide. Peduncles 3-5 cm long, pedicels 2-2.5 cm long. Calyx lobes 2-2.5 mm, corolla 12-15 mm across. Lobes of the pollinia are up to 5 mm long, about 2 mm wide. Umbel richly flowering, flowers waxy-white, glistening, fragrant with purplish stigmas." Variety minor differs "in the leaf arrangement with one leaf being an aerial root or tendril. The flowers are delicate and yellowish. The retinaculum is visible in the flower as a small dark-red button."

Rechinger describes H. pycnophylla as "a High climbing vine differing from H. upoluensis by much smaller, narrower leaves (9-12 by 2-3 cm) and with smaller flowers. Leaves as always paired and opposite, petiole 1 cm long. The diameter of the corolla spread out 9-10 mm 6 mm closed. Calyx lobes 1.5 mm long, umbel c. 20 flowered, fragrant, pure white. Peduncles 5-6 cm long, pedicels flexible, c 15 mm long."

Seemann described H. samoensis as "leaves prominently 3-5 veined from the base, 5-10 cm long, 2-5 cm wide, ovate to lanceolate. Peduncles 4-10 cm long, pedicels 16-24 mm long. Flowers 9-12 (15) mm across, fruit 12.5 -15 mm long.

H. australis R. Br.

H. bicarinata A Gray
H. pubescens Rein.

Type Locality: Australia?
Distribution: Australia to Samoa ?

Savai'i: W 128 (UHAW), W 636 (UAHW), W 1013 (UHAW), C 589 (BISH), C 917 (BISH) C 1867 (BISH, K), C 1869 (BISH, K, A) C 1942 (BISH), C 1970

(BISH), C 1973 (BISH, A), C 1974 (BISH,K), V 329 (B,K)
Upolu: W 182 (UHAW), W 201 (UHAW), W 377 (UHAW), B 1968 (BISH), B 2060 (BISH,GH,K) B 2241 (BISH, K), B 2319 (BISH,A,K,GH), Mc 2956 (BISH,E) C 447 (BISH,K), K 379 (W), K 996 (W), K 1533 (W), K 1667 (W), K s.n. (W), R 220 BISH,G,E), Hm s.n. (K?), Gf s.n. (K)
Tutuila: L 3090 (UHAW), Ws 118 (BISH), S 515 (BISH), G 556 (BISH), G 566 (BISH), G 615 (BISH)
Manu'a: W 1350 (UHAW),Y 9012 (BISH,K), Y 9449 (BISH), Y 9509 (BISH, A), G 556 (BISH) G 566 (BISH), G 615 (BISH)
Sin Loc: P 28 (K), P 29 (K), P 163 (K), P s.n. (K), Wt, 131 (K), USEE 2 s.n. (GH,US)
Not Seen: Ls s.n. (Tutuila)

3. **Hoya betchei** (Schltr.) Whistler

H. chlorantha Rech.
Physostelma betchei Schlechter

Type locality: Samoa
Type Specimen A. Betche specimen not located.

Savai'i: W 477 (UHAW), W 1796 (UHAW), B 2255 (BISH,GH), C 599 (BISH), C 610 (BISH), C 1870 (BISH,K), C 2881 (BISH)
Upolu: W 162 (UHAW), W 344 (UHAW), K 356 (W), K 1874 (W), Gf 6a (H)
Manu'a: Y 9528 (BISH)

var. tutuilensis (Chr.) Whistler

Tutuila: Lg. 3045 (UAHW), C 1011 (BISH- type), C 3562 (BISH)

This variety has maroon flowers and is endemic to Tutuila.

4. **Hoya filiformis** Rech.

H. attenuata Chr.
H crassior Hoch.
Tylophera filiformis (Rech.) Hochr. ?

Type locality: Upolu
Type specimen: One of Rechinger's

Savai'i: C 608 (BISH), C 759 (BISH), C 2164 (BISH,A,K)
Upolu: W 1106 (UHAW), W 1617 (UHAW), W 2015 (UHAW), H 3311 (G), H 3411 (G), K 996 (W), K 1500 (W), K 1700 (W)
Sin Loc: P 30 (K), P 211 (K)

Editors notes: I see several things here I can not agree with. *Hoya pot*sii is a plamately veined species whereas all Three of the Samoan species (*H. pycnophylla, H. samoensis* and *H. upoluensis* are triplinerved species. There are several other differences, see further text. I also do not agree with the other lumping of the Samoan species. (H. australis for now excepted).

Hoya whistlerii Kloppenburg

In Fraterna 15/1,7-10:2002

The following new species is named for Art Whistler. It gives me great pleasure to name this new hoya for this well renowned worker in the field of plant science who has concentrated on the flora of a number of Pacific Islands including the Samoan Islands, they origin of this new Hoya species.

ABOUT THE AUTHOR

Art Whistler was born near Death Valley, California, to which he attributes his early love of plants and vegetation. After receiving a B.A. and an M.A. at the University of California, he served three years with the U.S. Peace Corps in Western Samoa, where he taught high school biology. Resuming his schooling, he received a Ph.D. in Botany at the University of Hawai'i in 1979.

Since then he has made numerous research trips to Samoa, Tonga, the Cook Islands, Tahiti, Guam, and elsewhere in the Pacific, working on the medicinal plants, ethnobotany, and flora of the islands. Currently he is a botanical consultant working on various projects in the islands out of his consulting company, Isle Botanica, based in Honolulu. He is also a Research Affiliate at the Bishop Museum and an adjunct Associate Professor at the Lyon Arboretum in Honolulu. He has published several books on the botany of the Pacific islands, including *Flowers of the Pacific Island Seashore* (1992), *Polynesian Herbal Medicine* (1992), *Tongan Herbal Medicine* (1992), *Wayside Plants of the Islands* (1985), *Samoan Herbal Medicine* (1996), *Tropical Ornamentals* (2000), and *Plants in Samoan Culture* (2001), and has written numerous scientific articles on medicinal plants,

ethnobotany, and floristics of Polynesia. Future publication plans include a book on Samoan rainforests, one on the flora of Samoa, and a third on trees of Polynesia.

Hoya whistlerii Kloppenburg

Type description:

Hoya whistlerii Kloppenburg sp. nov. *Hoya chlorantha* Rechinger affinis sed calycis ovatis triangularis non oblongis lanceolatis. Coronae intus margine paulo incrassata minutisime et dense puberulis, centrum glabris non omnis puberula. Pollinarium maximum partem similis ut Hoyae sp. USDA 354238 et *Hoyae limonica* S. Moore.

Holotypus: (BISH) Whistler #3139, collected on the Samoan island of Ta'u.

This species is similar to *Hoya chlorantha* Rechinger but the calyx is ovate triangular not oblong lanceolate. The corolla inside has the margins thickened, minutely and densely puberulous with the center glabrous not puberulous all over. The pollinarium is most similar to that of Hoya sp. USDA 354236 and *Hoya limonica* S. Moore.

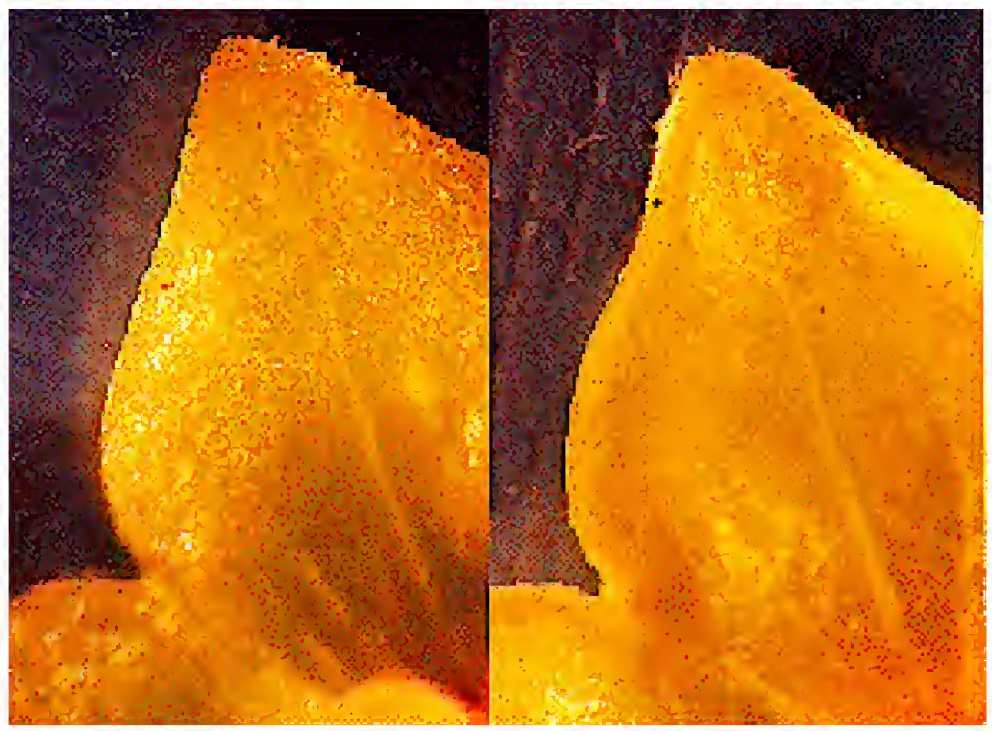
This is a vine with opposite, thick lanceolate leaves. The longest leaves are 5.5 – 10.5 cm long, mostly with acuminate apices. The sap is milky white, flowers are waxy and large (flattened 2.4 cm in diameter) pale green to white in color. Follicles are narrow with comose seeds. This species has been observed in lowland to montane forests, reportedly from 10-600 M. elevation. Endemic.

Above Photo from slide taken by Dr. Art Whistler

Photomicrographs from flowers sent to me by Ted Green, Kaaawa, Hawaii 2/3/95.
Collected by Art Whistler on Ta'u Island, Samoa. Flower large, lime green color.

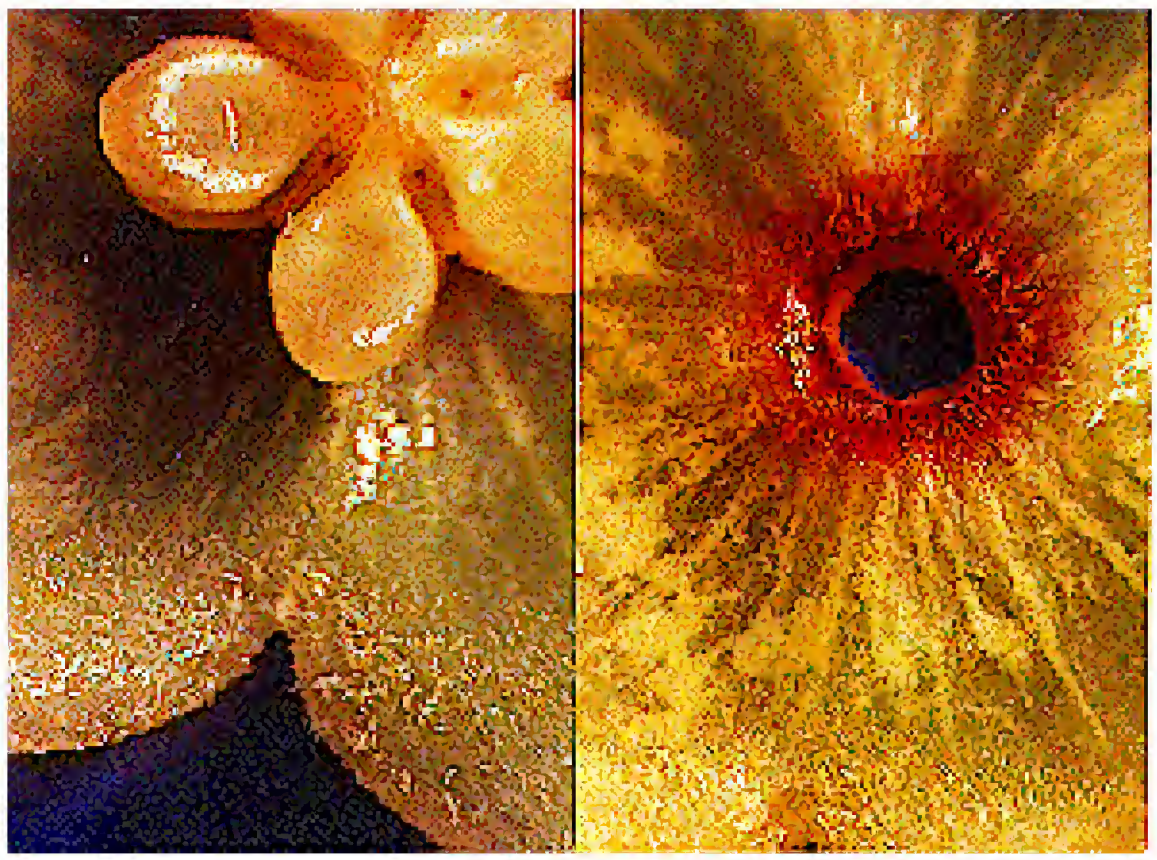
Pedicel, calyx and ovaries side view enlarged about 8X. Pedicel curved 2.5cm long by 0.10 cm in diameter, terete, glabrous with many longitudinal lenticels so surface is rough. Calyx cupped inwardly apically), receptacle enlarged knobby and granulose, rough with some pinkish tones. Inner surface glabrous. Sepals broad and short, ciliate 0.19 cm long and 0.18 broadest, overlapped at the base 0.06 cm; small dark ligules are present. Ovaries domed 0.17 cm tall, base of pair 0.16 cm

Top view of the calyx enlarged about 8X. The sepals are somewhat irregular, ciliate with small dark ligules at the bases (sinuses) Apex is tapered obtuse with broad bases and slight overlap.



Inner (left) and outer (right) surfaces of the corolla enlarged about 8X. The outer surface is glabrous, inner pubescent except near the center, apices obtuse, corolla cut more than half way. Flower flattened 2.40 cm in diameter.

Sinus to sinus	0.71 Cm
Sinus to apex	0.73 cm
Center to sinus	0.65 cm
Center to apex	1.20 cm



Corolla inside enlarged about 8X, showing the small crown with lobes a long way from reaching the corolla sinuses. Inside surface glabrous around the outer edges but glabrous inwardly and with stellate hairs around the reddish collar area.

Top (left) and bottom (right) view of the corona enlarged about 8X. Dorsal surface cupped, smooth and glabrous, inner lobe short and dentate; not reaching the center. Outer lobes obtuse, anther wings narrow, ventrally channeled by curved under sides of the scales but only to the ends of the anther wings; central column thick (0.20 cm in diameter) 0.12 cm tall; red colored.

Apex to apex	0.30 cm
Apex to center	0.34 cm
Widest	0.20 cm
Anther wing to aw.	0.21 cm
Retinaculum to ret.	0.10 cm
Ret. to center	0.09 cm
Ret to aw.	0.11 cm

Pollinarium enlarged about 83X. The translators are short supporting rather small caudicles. The retinaculum is large and has wide shoulders with the translator and caudicles entering above the hips.

Pollinia 0.59 mm long; widest 0.22 mm, both ends are rounded, pellucid outer edge extends all the way down the pollinium side, vacuole inward from here starts below the outer apex.
Translator 0.09 mm long ca. 0.03 mm deep.
Caudicle ca. 0.02 mm in diameter.
Retinaculum 0.25 mm long including extensions.
shoulders 0.18 mm broad.
waist 0.06 mm wide.
hips and extensions very short.

Art Whistler's Samoan Hybrid

In Fraterna 15/3:2002

Hoya x tuafanua Whistler & Kloppenburg hybrid nova. (= *Hoya australis* R. Brown x *Hoya chlorantha* Rechinger)

This species was collected by Art Whistler on Tutuila, Samoa 5 March 1988. Type sheet #10958. Hoya, vine with milky white sap leaves 7.5 - 9.5 cm long, x 4.0 - 5.4 cm at the widest; ovate, shortly apiculate, base obtuse. Pinnately veined, midrib protruding below, surface curved from midrib above, concave below. Glossy medium green above, more dull and lighter green below. Corolla margins and especially the tip revolute. Corona elliptic, inner lobe short, dentate, outer apex narrowly rounded, dorsal surface concave, below channeled. One plant seen in the forest on Tuafanua Ridge behind the village of Vatia at 100 m. elevation.

In postulating *Hoya australis* R. Brown as one of the parents we found the foliage of the hybrid to be similar in shape, size, venation and coloration. The Samoan Island subspecies of *Hoya australis* R. Br. have lighter green colored foliage than those subspecies found in Vanuatu and the Solomon Islands, and usually the leaf blade is smaller. The retinaculum of this hybrid is smaller in most dimensions than the *typical H. australis* but the structure of the pollinia, particularly the expanded area without pollen in from the lower end of the pellucid margins (and the way the pellucid edge curves outward) is typical of the pollinia of *H. australis*. It must be mentioned that the retinaculum is large as in *H. australis* but the head here is not as long, leaving the shoulders higher up on the overall structure.

The other parent is assumed to be **Hoya chlorantha* Rechinger. The corolla of this parent is cut well below the middle as is the hybrid, The coronal lobes are similar, and glabrous outside and finely pubescent inside as with our hybrid. The overall flower of *H. chlorantha* is smaller but one might expect hybrid vigor and enlarged flower parts in a hybrid. * Dr. Whistler feels the other parent is a variety of *Hoya vitensis Turrill (H. betchei, H. chlorantha*).

Internodes: long, terete, with finely puberulus, ca. 9 - 18 cm long, ca. 0.04 cm in diameter.

Petioles: terete, narrow 1.3 cm long, straight or curved, from slightly enlarged nodes.

Peduncle: nodal, straight, 2.5 cm long, 0.02 cm in diameter, slightly enlarged at apical end; with basal bracts at pedicel base, glabrous.

Pedicels: filiform, terete, glabrous, uniform 3.4 cm long, ca. 0.01 cm in diameter.

Pedicel and calyx enlarged about 8X. Pedicel as mentioned above, with a few scattered hair cells, 0.03 cm long.

Calyx when pulled from corolla cups upward tightly, outside many stiff hair cells and on the bulbous base.

Top view of the open calyx enlarged about 8X. Sepals overlapped slightly at the base with prominent ligules at the sinuses, edges ciliate; some hair cells on this surface. 0.24 cm long; to the center 0.34 cm 0.18 cm at the widest. Apex obtuse.

Ovaries: domed 0.15 cm tall and wide at the base of the pair, glabrous.

Outside view of the corolla center. Enlarged about 8X. This surface is glabrous with a raised collar from both surfaces. Edges of inner corolla surface turn under slightly at the sinuses. Radial vascular bundles are visible in pickled material.

Outer surface of the corolla at the Sinus area enlarged about 8X. Outer surface is glabrous inside surface is pubescent, more dense on the outer edges.

Inside surface of the corolla enlarged about 8X. This surface is pubescent.

Sinus - sinus	0.76 cm
Widest	0.80 cm
Sinus - apex	1.00 cm
Sinus - center	0.60 cm
Apex - center	1.35 cm

Inside view of the corolla lobe and the adjacent coronal lobes enlarged about 8X. The surface is more pubescent from below the ends of the coronal lobes outward, puburlent inward except around the short collar where there are inward pointing stellate hairs. The coronal lobes do not reach the corolla sinuses.

Inside view of the corolla at the sinus area and adjacent Coronal lobes enlarged about 8X. Again see the coronal lobes are short of reaching the corolla sinuses. Dorsal surface of coronal lobes are cupped especially in a channel down the center, here also is a linear raised umbo, Inner lobes are raised, relatively long and rounded; top sides and below are finely sulcate.

Top view of the corona enlarged about 8X. Surfaces are glabrous.

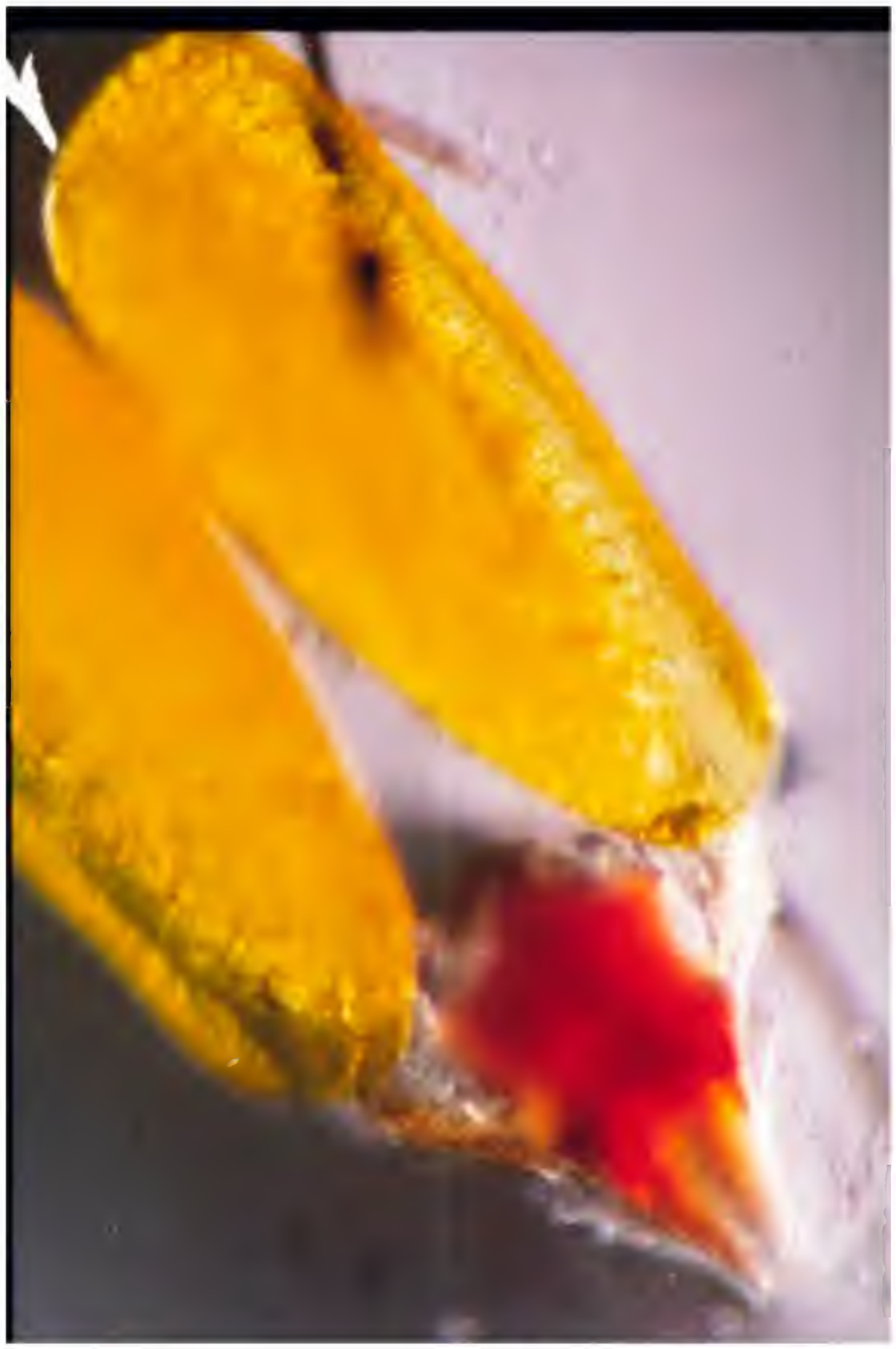
Apex - apex	0.41 cm
Apex - center	0.45 cm
Widest	0.20 cm
Aw. - aw.	0.23 cm
Ret. - ret.	0.14 cm
Ret. - center	0.10 cm
Ret. - aw.	0.10 cm

Bottom view of the corona enlarged about 8X. The lower side is channeled. There is a narrow lobe on each side starting just below thew outer apex of the anther wing and extending to the outer apex which is marginate (see the apex at the middle right) these surfaces are finely sulcate. Groove extends in from the sinus toward the central thin column, opening 0.16 x 0.13 cm ca. 0.05 cm tall. The apex of the anther wing is squared off.

Pollinarium enlarged about 82X.

Pollinia		
	length	0.65 mm
	widest	0.24 mm
Retinaculum		
	length	0.23 mm to crotch
	shoulder	0.19 mm
	waist	0.13 mm
	hip	0.18 mm
	extension	0.13 mm
Translator		
	length	0.26 mm
	depth	0.02 mm
Caudicle		
	bulb diam.	0.06 mm

More detailed photo of the lower pollinia area and the small caudicles and short translator arms along with the retinaculum. Enlarged as above. There is a wide vacuole on the inner end of the pollinia. a small clear bulbous caudicle supported by narrow up curved short translator arms.



Pollinarium enlarged about 165X.. Mostly to show the fine grained pollen, the wide vacuole near the inner apex of the pollinia, and the narrow translators. The retinaculum has distinct long extensions, broad shoulder and hip area.

Top view of the corona with 2 scales removed to expose the pentagonal stylar table which is raised in the center with the apex typically slightly divided and mealy. Note the dorsal surface of the lobe to the upper left that shown the channeled concavity with a long ridge down the center containing a small forward umbo. The inner lobes could most likely be classified ad spatulate, although much rounded and they do not reach the center.

Side view of a coronal scale enlarged about 8X. Anther wings are shallowly scythe shaped and there is a definite column supporting the scale, Inner lobe is raise but anthers are exposed, outer apex obtuse.

Non Endemic Hoya Species With Possible Alliances To Samoan Species

Hoya diptera Seeman 1861

Type description:

In Flora Vitiensis (1866) 163. 2. **H. diptera**, (sp. nov.) Seem. in Bonplandia vol. ix. p.257; scandens, glabra; ramulis 4-angulatis; foliis ovato-ellipticus acuminatis basi ovatis carnosis penninerviis; pedunculis compressis subulatis, petiolo longioribus; floribus flavis. —Viti Levu and Taviuni, on trees (Seemann ! n. 320) also collected by U.S. Expl. Exped.

Perhaps a specimen, without flower, collected in the Isle of Pines (M'Gillivray), which has leaves twice as large as those of my specimens, may belong to this species, of which there are also imperfect specimens only.

Translation: climbing, glabrous stems 4 angled; leaves ovate-elliptic, acuminate with the base ovate, fleshy, penninerved; peduncles flattened laterally somewhat, the petioles longer; flowers yellow.

Other literature:

In Journal of the Linnean Society of London 43 (1915) 33. "To the Flora of Fiji" L. S. Gibbs & W. B. Turrill. **Hoya diptera**, Seemann in Bonplandia, vol. ix (1861) p. 257, et Fl. Vit. p. 163. Suva, on Ivy trees in Government House paddock, in flower April 7th, 1905, im Thurn, F 7. Distr. Fiji (Viti Levu). Flowers yellow, i. e. "naiskun" coloured.

In Sargentia 2 (1942) 113. "Fijian Pant Studies" A. C. Smith. 5. **Hoya diptera** Seem. Ex A. Gray in Proc. Am. Acad. 5: 336, nomen. 1862; A. Gray in Bonplandia 10" 37, nomen. 1862; Seem. Fl. Vit. 163. 1866; Turill in Jour. Linn. Soc. Bot. 43: 33. 1915.

Vine with slender glabrous or distally puberulent branchlets, sometimes the branchlets short, lateral, densely foliaceous; petioles rugulose, *5-15 mm long, pale puberulent or glabrous; leaf-blades subcarnose, elliptic or ovate-elliptic or narrowly oblong. 3.5-8 cm long, (1-) 2-3.2 cm broad, obtuse base cuspidate or obtusely short acuminate at apex, pinnately-nerved, the costa slightly impressed or plane above, subprominent beneath, the secondary nerves 3 or 4 per side, ascending, oriented from costa toward base, prominent on both surfaces or submersed, the veinlet-reticulation immersed; inflorescences axillary, umbellate, the peduncle 10-45 mm long, glabrous or obscurely puberulent, ellipsoid-capitulate at the apex, sometimes verrucose for the distal 5 mm, the bracts inconspicuous; flowers 5-10 per umbel at anthesis, the pedicels slender, 8-20 mm long, glabrous or sparsely pale puberulent; calyx-lobes membranaceous,

inconspicuous, deltoid, 0.7-1.1 mm long and broad, glabrous except for the ciliate margin; corolla submembranaceous, **11-16 mm in diameter, yellow, copiously and conspicuously puberulent within, the lobes deltoid or ovate-deltoid, **4-6 mm long and broad, often recurved at margin, the sinuses acute; lobes of the corona thick, oblong, 3-4.2 mm long, 1.6-1.8 mm broad, obtuse at apex, acuminate at base, flattened above, rounded beneath; pollinia 0.5-0.6 mm long; carpels glabrous. * I doubt this discrepancy ** flowers do not vary this much!

Herbarium sheets: Viti Levu: Tholo North; Nauwanga, near Nandarivatu, alt. about 750 m., Degener 14333 (A) (vine, in open forest; corolla yellow, reddish toward center), Degener 14755 (A) (liana, in forest; corolla yellow); Naitasiri: Vicinity of Nasinu, alt. 150 m., Gillespie 3556 (BISH, UC) (liana with pendent inflorescences, in woods. Vanua Levu: Thakaundrove: Savuthuru Mt. near Velethi, alt. 90 m., Degener & Ordonez 13832 (A) (Vine in open forest; corolla yellow); Vatunivuamonde Mt. alt. 240 m., Degener & Ordonez 14014 (A) (vine in forest: corolla yellow). Without definite locality: Seemann 320 (Type coll., GH) (Viti Levu and Taveuni); U. S. Expl. Exped. (US).
As represented by the cited specimens, this species is characterized by inconspicuous calyx-lobes, a comparatively thin corolla which is yellow and perhaps reddish tinged at base within and by the ascending secondary nerves of its leaf-blades. The cited type duplicate does not show the flattened sbualate pedicels mentioned by Seemann, and I am inclined to believe that this character, apparently the source of the specific name, was due merely to the degree of pressing of the actual type. In foliage the type duplicate is an excellent match for the other cited specimens.
Corolla submembranaceous, yellow, the sinuses acute; secondary nerves 3 to 4 per side, ascending, oriented from costa toward base .....5. *Hoya diptera*.

In Flora of the Fiji Islands (1972). J. W. Parham. **Hoya diptera** Seem, ex A. Gray Bulibuli Sewaro; Draubibi; Wabi, Climbing with 5 to 10 yellow flowers per umbel. Moderately common. — 22, 29, 35, 480, 488, 770. (Suva)

In Flora Vitiensis Nova 4 (1988) 123. "A New Flora of Fiji" Albert C. Smith. 5. **Hoya diptera** Seem. in Bonplandia 9: 257* (Editors note: not on this page), nom. nud. 1861; A. Gray in Proc. Amer. Acad. Arts 5: 336, nom. nud. 1862, in Bonplandia 10:37, nom. nud. 1862; Seem. Viti, 439. nom. nud. 1862, Fl. Vit. 163. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 236. 1892;Turrill in J. Linn. Soc. Bot. 43:33.1915; A. C. Sm. in Sargentia l:113. 1942; J. W. Parham, Pl. Fiji Isl. 186. 1964, ed. 2. 263. 1972..... Figure 50.

An often high-climbing vine with white latex, found at elevations from near sea level to about 900 m. in dense, dry, or open forest. The corolla is yellow (infrequently noted as cream-colored), sometimes faintly reddish-tinged at base on both surfaces and the corona lobes are pale yellow to white, often dull red or pink toward base. As far as collections are dated, flowers have been obtained between October and January and in June: no fruiting specimens have been noted.

Typification: The type is Seemann 320 (K Holotype; Isotype at BM, GH); the holotype bears too specimens mounted on one sheet, one noted as from Taveuni and dated June.

1860, and the other from Viti Levu. It is not now possible to separate these and to indicate one as the Lectotype; they obviously represent the same species, and it seems best to treat them as jointly constituting the holotype. The binomial was mentioned several times before its description by Seemann in 1866.

Distribution: Presumably endemic to Fiji, thus far known from three of the high islands. However, the Samoan species should be critically, examined in this connection; *Hoya filiformis* Rechinger (1908) and *H. attenuate* Christophersen (1935) appear scarcely separable from *H. diptera*, although both are recorded as having white corollas.

Local Names: The recorded names are perhaps more strictly applicable to the better known *Hoya australis*: they are wa tambua, mbulimbuli sewaro, ndraumbimbi, and wa mbi.

Available Collections: Viti Levu: Mba: Vicinity of Nandarivatu. Gillespie 4009; Nauwanga, south of Nandarivatu. Degener 14333. 14735. Serua: Namboutini, H B. R. Parham 497; flat coastal strip in vicinity of Ngaloa. Smith 9680. Namosi: Nakavu. on Navua River, Horne (K); track to Mt. Vakarongasiu, DA 16141. Naitasiri: Between Naomi and Nasonggo. DA 15301; Waimbau, Sawani. DA 11212; Central road. Tothill 60'8, vicinity of Nasinu. Gillespie 3556. Rewa: Government House paddock. Im Thurn 7. Vaniua Levu: Mathuta: Southern base of Mathuata Range. north of Natua, Smith 6775: southern slopes of Mt. Numbuiloa, east of Lambasa. Smith 6586. Thakaundrove: Savuthuru Mt., near Valethi. Degener & Orderez: 13832; Vatunivuamonde Mt.. Savusavu Bay region. Degener & Ordonez 14014. Fiji without further locality. U. S. Expl.. Exped., Horne 66.

In Hoya Section Acanthostemma (Blume) R. D. Kloppenburg (1994) 31-34. R. D. Kloppenburg. **Hoya diptera** Seemann nomen in Flora Vitiensis (1866) 163; Bonplandia 9 (1861) 257.

Scandens, glabra; ramulis 4-angulatis; foliis ovato-ellipticus acuminatis basi ovatis carnosis penninerviis; pedunculis compressis subulatis, petiolo longioribus; floribus flavis. —Viti Levu and Taviuni, on trees (Seemann ! n. 320) also collected by U.S. Expl. Exped.

Perhaps a specimen, without flower, collected in the Isle of Pines (M'Gillivray), which has leaves twice as large as those of my specimens, may belong to this species, of which there are also imperfect specimens only.

Translation: Climbing, glabrous stems 4 angled; leaves ovate-elliptic, acuminate with the base ovate, fleshy, penninerved; pedicels flattened laterally somewhat, the petioles longer; flowers yellow.

A. C. Smith in Sargentia 2 (1942) 113 "Fijian Pant Studies" gives a lengthy description:

Vines with slender glabrous or distally puberulent branchlets, sometimes the branchlets short, lateral, densely foliaceous; petioles rugulose, 5-15 mm long, pale puberulent or glabrous; leaf-blades subcarnose, elliptic or ovate-elliptic or narrowly oblong. 3.5-8 cm long, (1-) 2-3.2 cm broad, obtuse base cuspidate or obtusely short

acuminate at apex, pinnately-nerved, the costa slightly impressed or plane above, subprominent beneath, the secondary nerves 3 or 4 per side, ascending, oriented from costa toward base, prominent on both surfaces or submersed, the veinlet-reticulation immersed; inflorescences axillary, umbellate, the peduncle 10-45 mm long, glabrous or obscurely puberulent, ellipsoid-capitulate at the apex, sometimes verrucose for the distal 5 mm, the bracts inconspicuous; flowers 5-10 per *umbel at anthesis, the pedicels slender, 8-20 mm long, glabrous or sparsely pale puberulent; calyx-lobes membranaceous, inconspicuous, deltoid, 0.7-1.1 mm long and broad, glabrous except for the ciliate margin; corolla submembranaceous, 11-16 mm in diameter, yellow, copiously and conspicuously puberulent within, the lobes deltoid or ovate-deltoid, 4-6 mm long and broad, often recurved at margin, the sinuses acute; lobes of the corona thick, oblong, 3-4.2 mm long, 1.6-1.8 mm broad, obtuse at apex, acuminate at base, flattened above, rounded beneath; pollinia 0.5-0.6 mm long; carpels glabrous.

Viti Levu: Tholo North; Nauwanga, near Nandarivatu, alt. about 750 m., Degener 14333 (A) (vine, in open forest; corolla yellow, reddish toward center), Degener 14755 (A) (liana, in forest; corolla yellow); Naitasiri: Vicinity of Nasinu, alt. 150 m., Gillespie 3556 (BISH, UC) (liana with pendent inflorescences, in woods. Vanua Levu: Thakaundrove: Savuthuru Mt. near Velethi, alt. 90 m., Degener & Ordonez 13832 (A) (Vine in open forest; corolla yellow); Vatunivuamonde Mt. alt. 240 m., Degener & Ordonez 14014 (A) (vine in forest: corolla yellow). Without definite locality: Seemann 320 (Type coll., GH) (Viti Levu and Taveuni); U. S. Expl. Exped. (US).

As represented by the cited specimens, this species is characterized by inconspicuous calyx-lobes, a comparatively thin corolla which is yellow and perhaps reddish tinged at base within and by the ascending secondary nerves of its leaf-blades. The cited type duplicate does not show the flattened sbualate pedicels mentioned by Seemann, and I am inclined to believe that this character, apparently the source of the specific name, was due merely to the degree of pressing of the actual type. In foliage the type duplicate is an excellent match for the other cited specimens. * these are not true umbels (umbel-like or clusters)

Additional herbarium sheets: Seemann Type #320 (A,K); Gillespie #4009, 3556; Degener #14333, 14755; Degener & Ordonez #13832, 14014; Horne #66; Pahan #497; DA #11212, 15301, 16141, A. C. Smith #9680 (UC), #7202, 6171, 6775, 6586; 62110, 6775 (US); Tothill #608; Thurn F-7.

Additional references: Gibbs & Turrill in Journal of the Linnean Soc. of London 43 #288 (1915-1917) 33. Parham in Flora of the Fiji Is. (1972). Symonds in Hoyan 2 (1980) #2. A. C. Smith 4 (1988) 123 in Flora Vitiensis Nova.

Comments: This species along with *Hoya eitapensis* Schlechter, *Hoya nummularioides* Constantine, and *Hoya flavida* Forster et Liddle belongs to a subsection of section Acanthostemma (Bl.) Kloppenburg; (Subsection Angusticarinata Kloppenburg). These species have very narrow shelves on the sides of the coronal scales which protrude only slightly beyond or are equal in length to the outer apex of the scale. This represents a transitional stage between species without side modifications of the scale and those species with well developed side extensions termed bilobed since they extend beyond the

outer coronal apex to varying degrees. All coronal scales are fully channeled below as are all species in this section.

Copy of the Iso Type Herbarium sheet #320 from the Gray Herbarium, reduced in size.

Photo of a plant in bloom at Fresno, CA. Here with seven flowers in an open cluster, all flowers not opening at the same time.

Picture by Ann Wayman, Central Point, Oregon. "Bright grass green oval leaves, neat grower. Nice basket plant ½" light yellow flowers, good bloomer".

The following photomicrographs are from flowers of a plant sent by Ted Green, Kaaawa, Hawaii from a plant collected in Vanuatu. Grown and flowered in Fresno, California.

Section of pedicel, calyx and ovaries enlarged about 8X. The pedicel is glabrous and the calyx is extremely small, rotate. Ovaries are domed, glabrous, pale yellow color.

Top view of the calyx enlarged about 16X. The sepals are very short and very broad at the base. Here on the right side some of the corola has remained when the calyx was removed. The sepals come nowhere near reaching the corolla sinuses.

Outside surface of the corolla lobe enlarged about 8X. The apex is apiculate, lobes are broad just out from the sinuses which are cut about half way. This surface is glabrous.

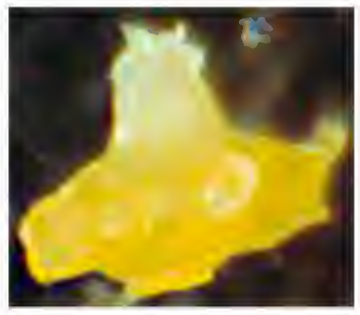
Inside surface of the corolla enlarged about 8X. This surface is puberulent with recurved margins and apex, texture is semi membranous. Coronal lobes reach the corolla sinuses.

Bottom view of the corona enlarged about 8X. The narrow bilobes roll under to form a channel and even overlap each other in the inner portions. The lobes extend to the apex which is curved under slightly. The lobe surfaces are sulcate. In the center is a well formed, thickened column.

Top view of the corona enlarged about 8X. Scales have a rather narrow top with narrow bilobes extending don the lower sides of the scales and meeting just before reaching the outer apex which is narrowly rounded. Inner lobes are short, narrowly rounded and do not reach the center. The anthers are very broad, close over the domed stylar center.

Anther wings (2) considerably enlarged. The bottom one with the apex to the left. The anther envelopes (2) are a deep yellow and thickened whereas the remainder of the anther is very membranous. The anther base is very broad. I usually do not show the anthers but they are significant and differ among the different hoya species.

Stylar pentagonal crown enlarged about 16X. The pentagonal area shows up as rich yellow the raised center is domed with a slight apiculate center. On the two top corners you can still see the retinacula attached in their normal positions. To the far upper left is an anther folded back, and below some of the column material.



Side view of the stylar crown enlarged about 8X. Note the striated sides of the center and the small apiculate apex.

Side view of a coronal scale enlarged about 8X. Outer lobe sloping to a narrow rounded apex inner lobe shot spatulate inner lobe. Scale is rather deep and not with prominent anther wings.

Pollinaria enlarged not quite 165X. The unusual aspect of this pollinarium is that the clear caudicles envelope the translators and at one focal length (right) stand out above the translators.

Pollinia		
	length	0.320 mm
	widest	0.162 mm
Retinaculum		
	length	0.134 mm
	shoulder	0.060 mm
	widest	0.050 mm
	hips	0.070 mm
	ext.	0.050 mm
Translator		
	length	0.140 mm
	depth	0.050 mm
Caudicle bulb diameter		0.090 mm

Hoya vitiensis Turrill

Type description:

In Journal of the Linnean Society 43 (1917) 34. H. S. Gibbs & W. B. Turrill. **Hoya vitiensis**, Turrill, sp. n. *H. subcalva*, Burkill, affinis, sed corolla intus dense pustulata, coronae radiis latioribus distinguenda.

Rami subteretes, glabri. Folia elliptico-oblonga vel elliptico-ovata, apice attenuate acuminata, basi rotundata vel subcordata, usque ad 10 cm longa et 7 cm lata, integra, glaberrima, nervis lateralibus utrinque circiter 7 marginem versus anastomosantibus siccitate cum costa pagina utraque prominentibus, transversis uti reticulatione prominentibus; petioli 0.5-1.5 cm longi, crassiores, glabri. inflorescentia umbellata, circiter 12-15 flora; pedunculi graciles, teretes, 4.5 cm longi, pedicelli graciles, teretes, 3.8 cm longi, glabri. Sepala 5, subtriangularia, subacuta, 1.75 mm longa, 1.5 mm lata, distincte ciliata. Corolla ad medium divisa, 2 cm diametro, intus omnio pustulata, 5-lobata, lobis 5 mm longis 7 mm latis acutis; coronae radii 4 mm longi medio 2.75 mm lata, glabri, nitentes. Pollinia 1 mm longa.

Nandarivatu, in flower Nov. 20th, 1906, im Thurn, 260.

Translation: Near *Hoya subcalva* Burkill, but the corolla inside is densely pustulate, and a distinct longitudinal corona radius. Stems almost round glabrous. Leaves elliptic-oblong or elliptic-ovate, with apex attenuate acuminate, base rounded or almost cordate, up to 10 cm long and 7 cm wide, entire, glabrous lateral nerves on both sides about 7 almost to the margins anastomosing when dry with the midrib flat prominent on both sides. Reticulations prominent in a transverse manner; petiole 0.5 to 1.5 cm long, thick, glabrous. Inflorescence umbellate, about 12-15 flowered; peduncle narrow, round 4.5 cm long ; pedicels narrow, round, 3.8 cm long, glabrous. Sepals 5, almost triangular, somewhat acute, 1.75 mm long, 1.5 mm wide, distinctly ciliate. Corolla divided half way, 2 cm in diameter, inside altogether pustulate, 5-lobed, lobes 5 mm wide acute; radii of the corona 4 mm long in the middle 2.75 mm wide, glabrous, shinny. Pollinia 1 mm long.

Other literature:

In Sargentia 2 (1942) 112-113. "Fijian Plant Studies" A. C. Smith.

From the Key:

Calyx-lobes deltoid or ovate-deltoid, inconspicuous, 0.7-1.7 mm long, glabrous except for the ciliolate margin.

Corolla subcarnose, purplish or reddish, the sinuses obtuse; secondary nerves-5-7 per side, spreading .....4. **H. vitiensis**.

4. **Hoya vitiensis** Turrill in Jour. Linn. Sac. Bot. 43: 34. 1915.

Vine with slender terete glabrous branchlets; petioles stout, shallowly caniculate, 5-19 mm long; leaf-blades carnose or chartaceous, elliptic-ovate or oblong-elliptic, 6-11 cm long, (1.5) 3-7 cm broad, rounded or obtuse or subcordate at base, acuminate or

cuspidate at apex, pinnate-nerved, the costa slightly impressed or elevated above, subprominent beneath the secondary nerves 5-7 per side, spreading, anastomosing toward margins, slightly raised on both surfaces, the veinlet-reticulation prominulous on both surfaces or sometimes immersed; inflorescences axillary, umbellate, glabrous throughout except corolla, the peduncle slender, 30-55 mm long, ellipsoid-capitulate at apex and occasionally verrucose for the distal 15 mm, the bracts minute; flowers 12-20 per umber at anthesis, the pedicels slender; 22-40 mm long; calyx-lobes membranous, inconspicuous, ovate-deltoid, 1-1.7 mm long 1.2-1.5 mm broad, obtuse at apex, glabrous except at the ciliolate margin ; corolla subcarnose, 16-20 mm in diameter, copiously and conspicuously sericeo-puberulent within, the lobes deltoid, 5-7 mm long, 6-8 mm broad, often recurred at margin, the sinuses obtuse; lobes of corona thick, oblong, 4-5 mm long, 1.5-2.7 mm broad, obtuse at apex, acuminate abase, flattened above, rounded and deeply sulcate beneath;, pollinia 0.6-1 mm long, carpels glabrous; Fruits about 3 per mature inflorescence, the calyx persistent, the calyx linear, 16-21 cm long, 7-9 mm in diameter, striate when dried, glabrous.

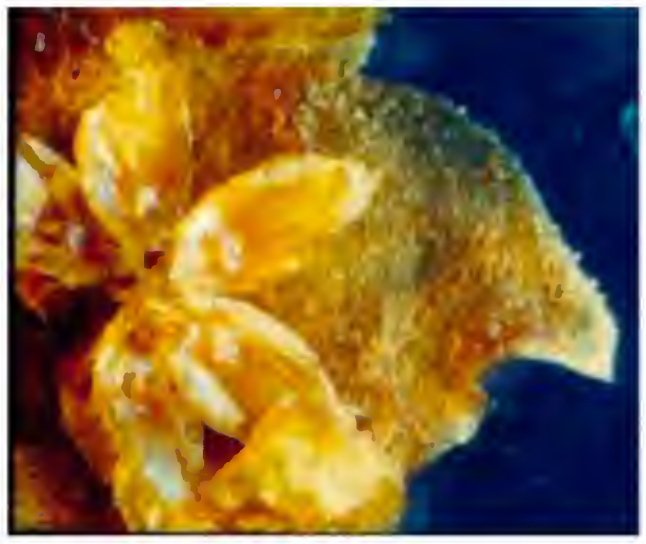
Viti Levu: Tholo North: Vicinity of Nandarivatu, alt. 750-1000 m. Parks 20723 (Bish, UC) (vine, on trees in forest. flowers maroon or waxy-purple-white) Degener 14304 (A) (vine, in forest; corolla pale purplish red, velvety; corona pale claret); Mt. Matomba, near Nandarivatu, alt. 750-900 m., Degener 14627a (A) (native name: wandra used for garlands), Namosi: Vicinity of Namosi, alt. 450 m., Gillespie 2599 (Bish) (native name: wa tambua ndamundamu) ; Mt. Naitarandamu, alt. 900 m. Gillespie 3095 (Bish); Rewa: Vicinity of Suva, alt. 150 m.. Gillespie 2180 (Bish, UC) (in woods); Naitasiri: Mt. Korombamba, southeastern slopes, alt. 300 m Gillespie 2305 (Bish, UC).
Without definite location: Horne (GH).

Although I have not seen the type, collected at Nandarivatu by im Thurn, the original description leaves no doubt as to identification of the species. Noteworthy characters are found in the densely pubescent thick corolla, the lobes of which are separated by obtuse sinuses, the inconspicuous calyx-lobes, and the spreading secondary nerves of the leaf-blades. Specimens with adequate notes apparently have the corollas richly colored, a character which contrasts faith such species as *H. australis*, *H. intermedia*, and H. *diptera*.

The identity of *H. Barracki* Home (A Year in Fiji. 263, nomen.1881) is dubious, although Baker (in Jour. Linn Soc. Bot. 20 369. 1883) refers it to *H. australis*. If the above cited Horne specimen at GH represents a duplicate of *H. Barracki*, the name should he referred to *H. vitiensis*.

In Flora of the Fiji Islands (1972). J. W. Parham. **Hoya vitiensis** Turrill WA Dra; Wa Tabua Damudamu. A climber with 12 to 20 reddish coloured flowers per umbel. Moderately common. — 229, 488, 770. (Suva).

In Flora Vitiensis Nova 4 (1988) 123. " A New Flora of Fiji". Albert C. Smith.
4. **Hoya vitiensis** Turrill in J. Linn. bloc. dot. An; 34. 1915; A. C. Sm. in Sargentia 1: 112. 1942; J. W. Parham, Pl. Fiji Isl. 186. 1964, ed. 2. 263. 1972. Figure 49.
A vine climbing on trees in dense or dry forest at elevations of 50-1,323 m. This colorful species has the calyx lobes rich pink to purple, the corolla purple or pale purplish



Inside view of the flower enlarged about 8X. Surface of the corolla is pubescent, lobes very wide above the sinus. Coronal lobes do not reach the corolla sinuses, inner lobes knife like clear to the center but anthers rise over the inner lobes, Dorsal is concave with a umbo near the inner apex and surface is longitudinally sulcate, edges sharp, outer lobe is tapered sub acute. Stiff hair cells under corona point centrally.

Top view of the corona scales not regular due to red or brownish. sometimes pale pink without and with the lobes yellowish margined, and the corona lobes rich, deep purple and sometimes tipped with pale green. Flowers have been obtained in the months between July and March, fruits in February and March.

Typification: The species is based on ins Churn 260 (K Holotype), collected Nov. 20, 1906, near Nandarivatu, Mba Province. Viti Levu.

Available Collections: Viti Levu: Mba: Slopes of Mt. Yöo. crest of Nandarivatu. Webster & Hildreth 14150. vicinity of Nandarivatu, Parks 20732. Degener 14304; Mt. Matomba, south of Nandarivatu, Degener 14627a: summit of Mt. Tomanivi. DA 7135. Serua: Tawavulu Creek. north of Ngaloa. Webster & Hildreth 14347. hills between Waininggere and Waisese Creeks, between Ngaloa and Wainiyambia, Smith 9529. Namosi Mt. Naitarandamu. Gillespie 3095: northern base of Korombasambasanya Range, in drainage of Wainavindrau Creek. Smith 8660: Korombasambasanga Range. DA 2163: vicinity of Namosi, Gillespie 2599, Wainandoi River. D.4 12509. Naitasiri: Tholo-i-suva, DA 9822; Central road, Torhill 604, 609, Rewa: Mt Korombamba. Gillespie 2305; vicinity of Suva, Gillespie 2180. Vanua Levu: Mathuata: Mountains near Lambasa. Greenwood 632. Fiji without definite locality, Horne s. n. (GH. not a duplicate of Horne 1096 i. e. not *H barracki* nom. nud.

Picture of the flowers and foliage author unknown labeled IML469 = IML270.

Photomicrographs follow, flowers from Herbarium sheet (UC) #20723.

Pedicel, calyx and ovaries side view enlarged about 8X.

Pedicel: 3/3 cm long, terete, a very few scattered hairs. 0.05 cm in diameter.

Ovaries: 0.15 cm tall. Columnar nipple ended.

Calyx: sepals outside glabrous, ciliate, inside glabrous shiny. 0.10 cm long, 0.11 cm widest, overlap about ¼. 2 ligules at each sinus.

Corolla outside view enlarged about 8X. Pedicel curved. Calyx small, sepals do not come near the corolla sinuses. Corolla outside granulose, inside velvety pubescent, papillose.

Corolla inside view enlarged about 8X. Inside velvety pubescent, lobes broad. Coronal inner lobe does not reach the corolla sinus.

Sinus – sinus	0.70 cm
Sinus – apex	0.62 cm
Apex – center	1.00 cm
Widest	0.74 cm

Bottom view of then corona enlarged about 8X. The bottom is channeled well in toward the raised column. Column 0.08 cm tall and thickened. Inner lobe is spatulate, Outer lobe tapering rounded.

Side view of a corona scale enlarged about 8X. Inner lobe raised ad spatulate dorsal curved downward to the outer apex. Anther wing deeply scythe shaped. Anther rises above inner lobe.

Apex – apex	0.35 cm
Apex – center	0.45 cm
scale depth	0.20 cm

Pollinarium enlarged about 83X. The retinacular head is to the bottom left.

Retinaculum		
	length	0.27 mm
	shoulders	0.16 mm
	waist	0.09 mm
	hips	0.16 mm
	extensions	nill.
Translator		
	length	0.01 mm
	depth	0.03 mm ca.

Pollinium enlarged about 83X. Top and base rounded, (obtuse).

Pollinia

length	0.68 mm
widest	0.27 mm

An oddity I collected in Western Samoa.

Hoya sp. Western Samoa Double Corolla

Cutting was collected by me in Western Samoa, Lake Lanatoo area in 1988, sent to Michael Myashiro who bloomed it and sent me flowers. It was photographed in 5/21/90. Michael could not remember the plant, but I assume it may still be in existence.

Photomicrographs follow:

Side view of the pedicel, calyx and ovaries enlarged about 8X. Pedicel is terete, glabrous, filiform, creamy yellow color 1.6 cm long 0.10 cm in diameter. Calyx outside granulose with a few scattered hair cells.

Top view of the calyx enlarged about 8X. (picture blurred) Sepals 0.17 cm long 0.16 cm wide. Ligules present in pattern 2-2-1-1-1, Calyx 0.50 cm in diameter.

Outside surface of double corolla enlarged about 8X. Inner and outer surface of the outer corolla are both glabrous. Inner surface of inner corolla is papillose. Outer surface glabrous. Outer corolla lobes cur very deeply. Outer row of 5 lobes shorter then inner set.

Inside view of this flower enlarged about 8X. Flower flattened is 1,60 cm in diameter. See pubescence on inner corolla inner surface.
Inside corolla:

Apex – sinus	0.55 cm
Apex – center	0.80 cm
Sinus – sinus	0.34 cm
widest	0.40 cm

Another inside top view of the flower enlarged about 8X. Both corollas are cupped. The apices of all the lobes are very acute and attenuate.

Underside of the corona enlarged about 8X. The underside is channeled with the apical area being open, apex slightly recurved. Groove extends well in toward the central thickened column which is 0.10 cm tall with an inside diameter of 0.15 cm x 0.25 cm Surfaces are sulcate.

Top view of the corolla enlarged about 8X. Lobes are short and fat. Inner lobes short and dentate, they do not reach the center but the outer lobes do reach the sinuses of the inner corolla. Anther wings protrude. Corona is horizontal, dorsa; surface essentially smooth.

Apex – apex	0.30 cm
Apex – center	0.37 cm
widest	0.20 cm

Side view of a coronal scale enlarged about 16X. Inner and outer apices both rounded, anther extends inward beyond the inner apex, Anther wings are deeply scythe shaped. Material from the long column shows at the bottom right.

Pollinarium enlarged about 165X. The retinaculum is not in focus so measurements are taken from other pictures.

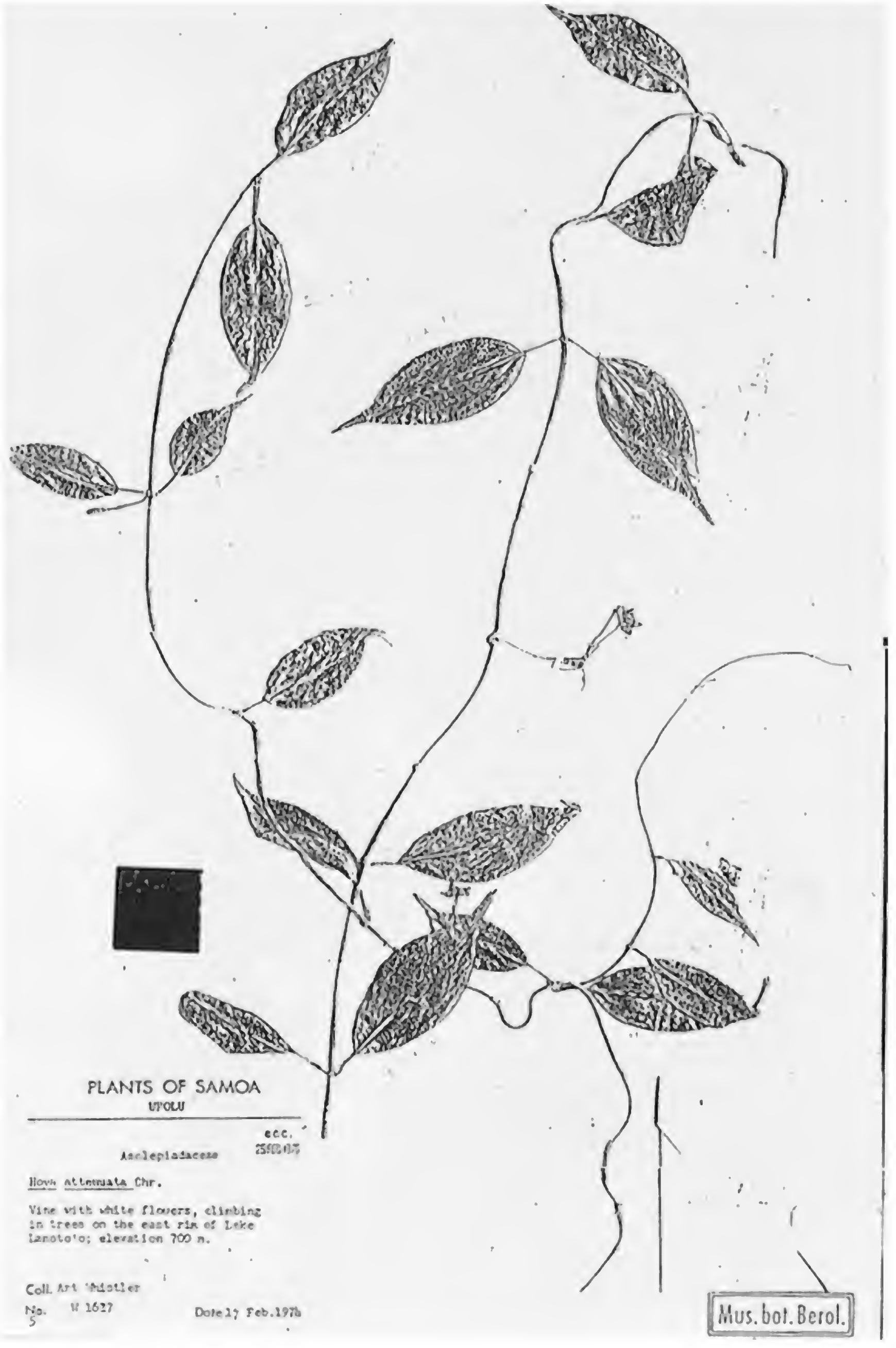
Pollinia		
	length	0.55 mm
	widest	0.19 mm
Retinaculum		
	length	0.23 mm
	shoulder	0.10 mm ca.
	waist	0.06 mm
	hip	0.10 mm
	extensions	0.05 mm
Translator		
	length	0.10 mm
	depth	0.02 mm
Caudicle		
	bulb diameter	0.06 mm

Art Whistler's Samoan Herbarium Sheets

9456	Savai'i	sp. nova	30 April 1944
8798	Ofu	sp. nova	15 June 1992
7605	Ta'u	sp. nova	19 Dec. 1990
7989	Ta'u	sp. nova	9 Jan. 1991
W3801	Olosega		9 Dec. 1976
W2705	Tutuila	filiformis	22 June 1975
10339	Upolu	diptera	3 April 1997
10007	Upolu	diptera	14 May 1996
9539	Savai'i	cf. diptera	9 May 1994
1617	Upolu	filiformis	17 Feb. 1974
1106	Upolu	filiformis	14 Nov. 1973
5714	Upolu	betchei	18 May 1985
3961	Upolu	betchei	29 Aug 1978
2643	Savai'i	betchei	3 June1975
W3252	Upolu	betchei	2 Jan. 1976
W1983	Upolu	attenuata/betchei	15 April 1974
8505	Tutuila	pottsii	16 April 1993
9089	Tutuila	pottsii	5 April 1992
W1046	Savai'i	samoensis	23 Oct. 1973
W1237	Savai'i	samoensis	29 Nov. 1973
W1297	Ta'u	samoensis	15 Jan. 1974
W1024	Savai'i	samoensis	22 Oct. 1973
1985	Tutuila	pycnophylla/pottsii	2 July 1964
W206	Upolu	pycnophylla/pottsii	24 July1972
W1506	Upolu	samoensis	5 Feb. 1974
10477	Upolu	vitiensis	31 May 1997
3045	Tutuila	betchei	6 June 1965
3045	"	" var. tutuilensis	"
8717	Tutuila	vitiensis	11 June 1992
445	Panafu	betchei	20 April 1906
W162	Tiavi Upolu	chlorantha/beitchei	18 July 1972
W5165	Savai'i	betchei	29 Aug. 1982
W477	Savai'i	chlorantha/beitchei	12 Aug 1973
6871	Savai'i	betchei	8 Aug. 1989
W1796	Savai'i	chlorantha/beitchei	13 Mar. 1974
W4443	Upolu	betchei	12 July 1980
W3111	Tutuila	betchei	13 Aug. 1975
W3110	Tutuila	betchei var. tutuil.	13 Aug. 1975
W3245	Upolu	betchei	2 Jan. 1976
W344	Upolu	chlorantha/beitchei	19 July 1973
W2793	Tutuila	betchei	7 July 1975
W2765	Tutuila	betchei	5 July 1975
W3243	Upolu	betchei	2 Jan. 1971

7020	Upolu	beitchei	28 Nov. 1989
8366	Upolu	vitiensis	21 Sept. 1991
8232	Savai'i	vitiensis	6 Sept. 1991

Copies of Herbarium Sheets
Size reduced from 12" x 18".
Black square in copies represents 1" square.


PLANTS OF SAMOA
UPOLU
ecc.
Asclepiadaceae
Hoya attenuata Chr.
Vine with white flowers, climbing in trees on the east rim of Lake Lanoto'o; elevation 700 m.
Coll. Art Whistler
No. W 1627
5
Dated Feb. 1978
Mus. bot. Berol.

Previous sheet:

W 1617 17 Feb. 1974 (B) Art Whistler. Vine with white flowers, climbing in trees on the east rim of lake Lanato'o, elevation 700 m.. As *Hoya attenuata* Christopher. Leaves glabrous, broadly elliptic attenuate, 3.4 - 6.6 cm x 1.3 - 1.9 cm widest; pinnately veined but obscure. (2 long branches, stems very fine, 4 pairs of leaves + 1, and peduncle; 3 pairs of leaves + 2 singles, 2 pedicels, one with 1 flower). Internodes: 4.3 - 10.0 cm long, terete, glabrous, fine. Peduncles 0.9-2.0, rachis round even, 0.7 cm long. Pedicel 1.7 cm long, filiform, terete, glabrous. Corolla campanulate.

Following sheets:

2164 24 July 1931 (US) *Hoya attenuata* E. Hume **Type.** Forest above Matavanu crater, elevation 1300 m., Savai'i, Samoa. One branched stem 11 leaves + 2 loose. Leaves glabrous, elliptic attenuate, 4.6- 6.0 cm long x 1.1 - 1.9 cm widest near middle, petioles mostly 0.8 cm long, fine, glabrous, pinnate veins obscure. Stem thick, terete, 0.4 cm in diameter, rough, glabrous, nodes enlarged a little.

W 4520 13 July 1980 (B) Art Whistler. A climbing vine with milky sap & white flowers, red center, growing on trees on the shore near Falemoa, Samoa. Det. *Hoya austr*alis R. Br.. Short stem 1 pair of leaves, 1 flower cluster ca. 30 + flowers. Leaves glabrous, broadly ovate apiculate 10 cm long 6 cm widest, pinnately veined (obscure). Petiole 2.5 cm, narrow. Stem thick 0.5 cm in diameter. Peduncle straight, terete, glabrous, 3.8 cm long x 0.1 cm diameter. Pedicels 2.5 cm long.

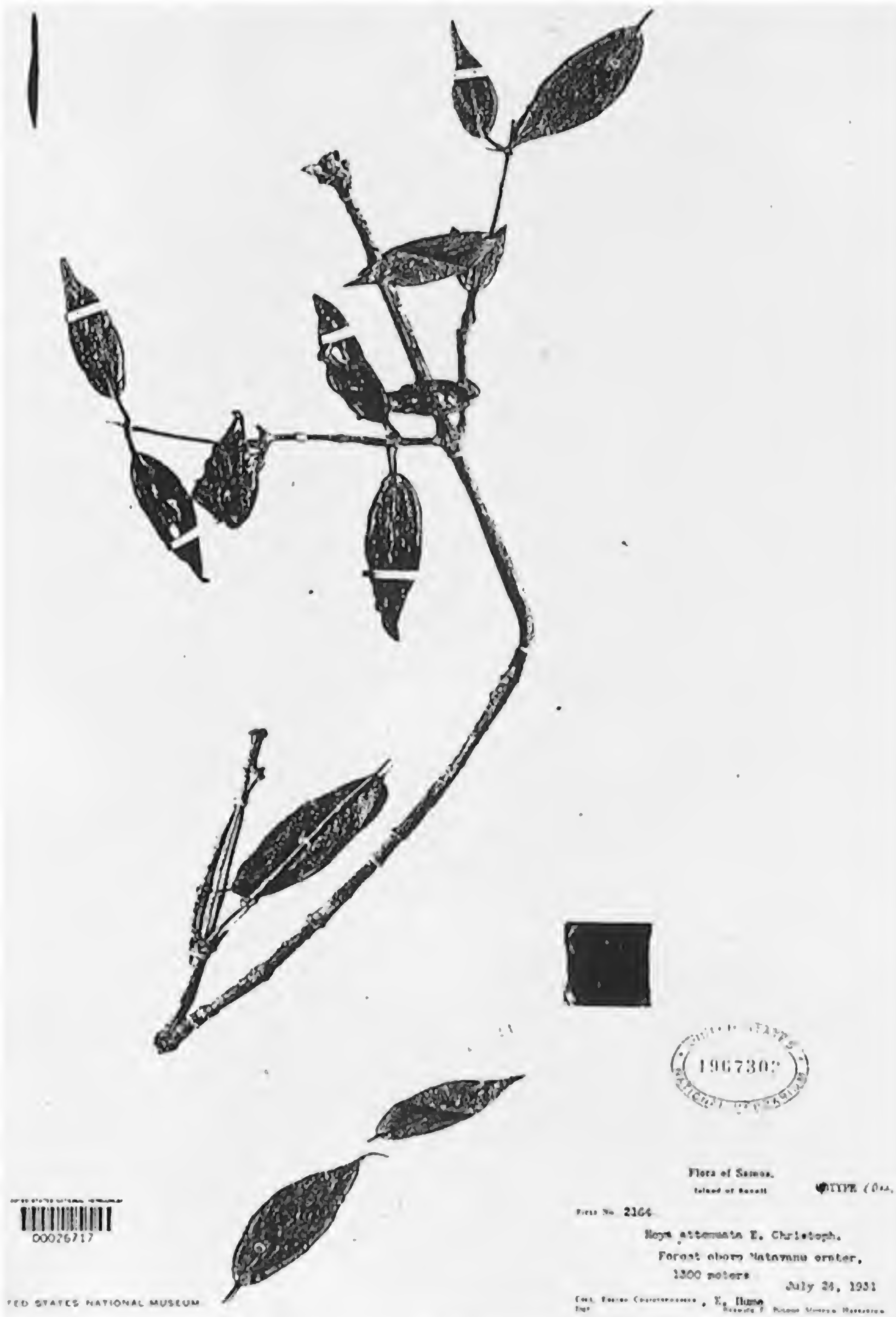
s.n. Hoya beitchei (Schlechter) Whistler. (B) See type description above.

W 1106 14 Nov. 1973 Art Whistler. Det. C. M. Burton *Hoya filiformis* Reich. (US) Vine with milky sap, flowers white, growing in the forest from a tree on top of a crater SE of Mt. Mariota: elevation 600m. One stem branched 9 leaves one peduncle with 7 flowers. Leaves: glabrous, ovate-elliptic, long attenuate 5.0 - 7.5 cm long x 2.5 - 2.8 at the widest near the middle. Petioles 0.7 cm long, glabrous fine. Internodes: glabrous, terete 3.0 - 7.5 cm long. Petduncle: glabrous fine, ca. 2 cm long, with rachis 0.5 cm long rough, tapered round. Pedicels: terete, filiform 1.4 cm long. flowers small.

W 10958 See type description under Whistler's hybrid above. *Hoya x tuafanua* Whistler & Kloppenburg (HAW).

W 3139 See description above under *Hoya whistlerii* Kloppenburg (HAW).

11596 9 Dec. 2001 (BISH) Art Whistler. *Hoya cf. vitiensis*. Vine with milky sap, thick succulent leaves & pale purple flowers on ridge behind Vatia marsh at 100 m. elevation. 1 stem 2 pairs of leaves 1 peduncle. Stem glabrous, thick 0.3 cm diam. Leaf glabrous, obovate short attenuate, base narrowly rounded, pinnate venation, 7.0 - 8.5 cm long and 3.0 - 3.5 cm widest. Petiole 1.2-1.4 cm long, glabrous. Peduncles 2.3 cm long, rachis irregular rough.


1967302
Flora of Samoa.
TYPE
Field No. 2164
Hoya attenuata K. Christoph.
Forest above Matavanu crater,
1300 meters
July 24, 1931
E. Hume
00026717
TED STATES NATIONAL MUSEUM

PLANTS OF SAMOA

Asclepiadaceae

acc. 15 Oct 1980

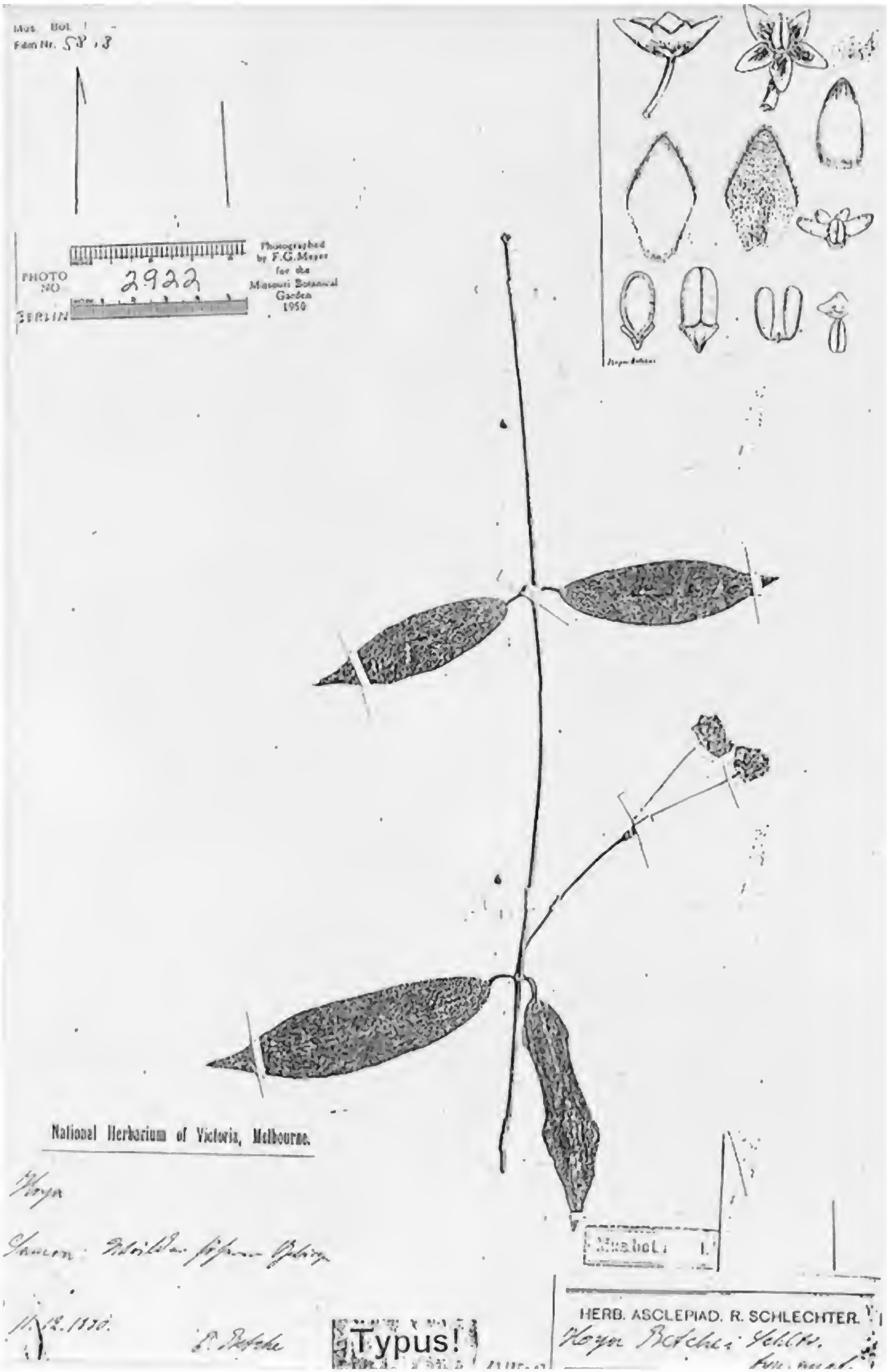
Hoya australis R.Br.

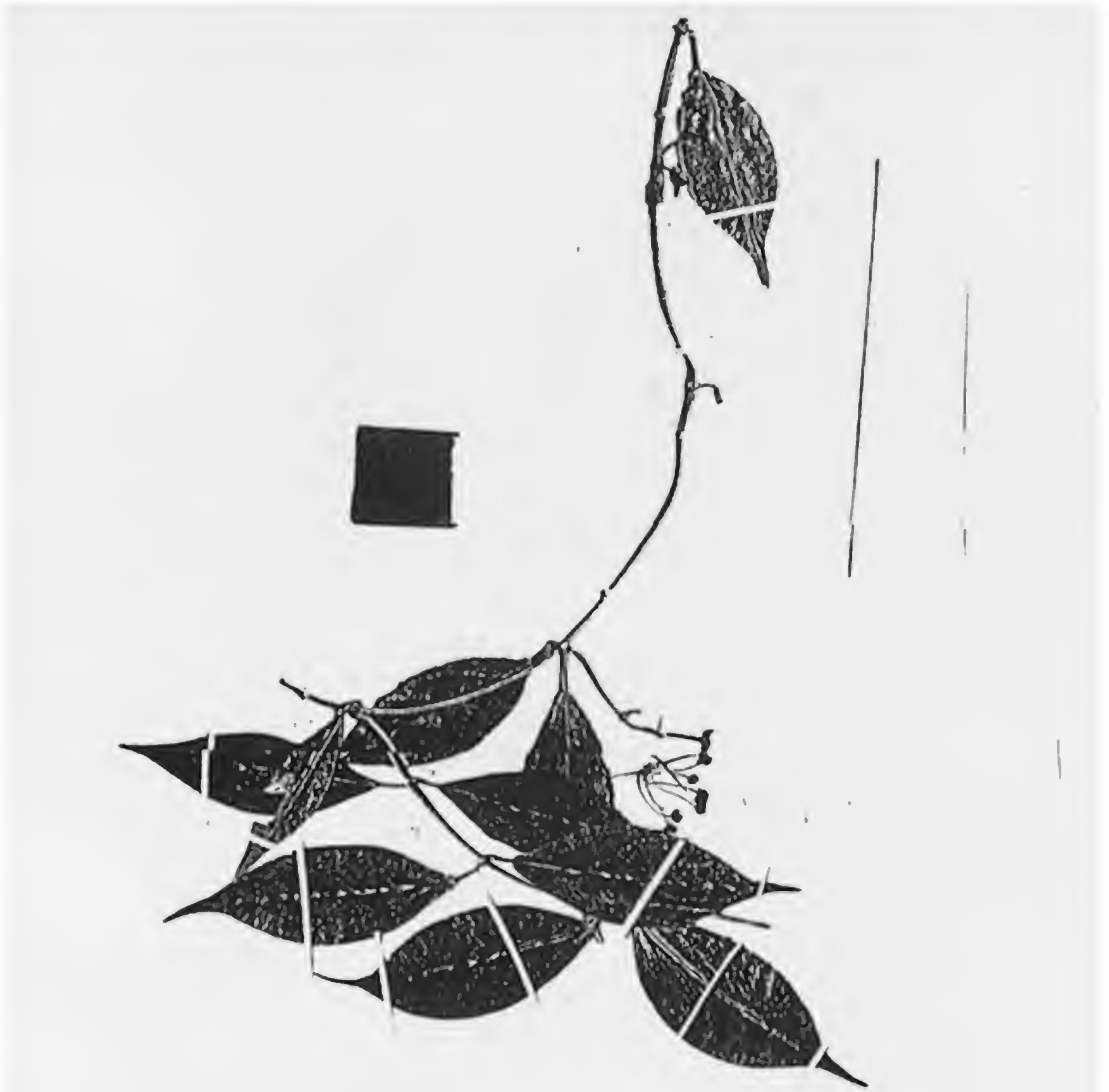
A climbing vine with milky sap and white flowers red in the center, growing on trees on the shore near Falemoa on the north side of the island.

Coll. Art Whistler

No. W 4520

Date 23 July 1980


Mus. Bot. !
Photographed by F.G.Meyer for the Missouri Botanical Garden 1950
PHOTO NO 2922
Typus!
National Herbarium of Victoria, Melbourne.
HERB. ASCLEPIAD. R. SCHLECHTER.



PLANTS OF SAMOA
UPOLU

Asclepiadaceae

Hoya

Vine with milky sap, flowers white, growing in the forest from a tree on the top of a crater SE of Mt. Mariota; elevation 600 m.

Coll. Art Whistler
No. W 1106 Date 14 Nov.1973

UNITED STATES

2885765

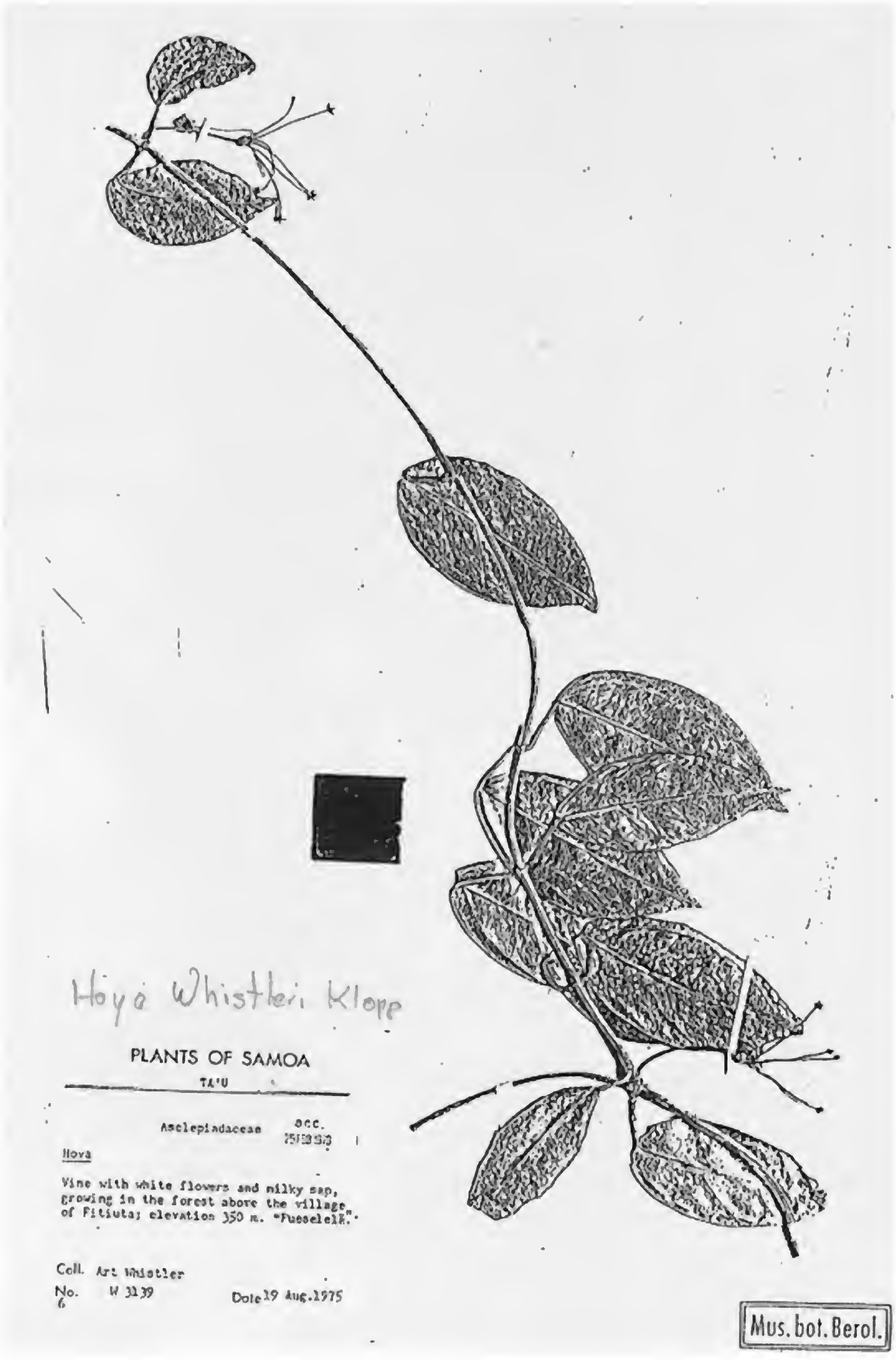
NATIONAL HERBARIUM

Hoya filiformis Rech.

Det. C.M. Burton

12-10-85

Type Sheet Copy



Type Sheet Copy

Data on Dr. Whistler Herbarium Sheets

Samoan Hoya's First folder

Contents labeled *Hoya pottsii* Trail 1830.

List of sheets: (10)		Listed	Determination
W 206		pycnophylla/potsii	close to pycnophylla (lf. larger and wider
W 1024		samoensis	**no known species**
W 1046		samoensis	probably correct
W 1237	*	samoensis	probably correct
W 1297	*	samoensis/potsii	This and next same sp. not as
W 1460		samoensis	identified
W 1506	*	samoensis	maybe samoensis
1985		samoensis	maybe samoensis
8505	*	pottsii	prob. samoensis
9089	*	pottsii	**not any listed species**

* flowers micro-photographed

Data and photos of flower parts of each sheet follows (for those sheets with loose flowers). Sheets have been reduced to scan and place in this file. Sheets are 11.5" x 16.5 " in the natural state.

No flowers with sheet.

Description of the herbarium sheet above W 206:

W 206 first labeled *Hoya pycnophylla* Richinger (1908). 24 July 1972. Sterile vine climbing on coastal tree between Falelatai and Fagaifu. 4 leaves nervation 3 strong, 2 faint tuplinerves. Leaves glabrous, large 10.0 - 11.2 cm long, 4.5 - 4.8 cm wide; nerves visible on both surfaces, broadly ovate-elliptic attenuate, apex acute, base obtuse, 1 pair of faint nerves near margins, 2nd pair from near base, 3rd pair begin ca. 1.5 cm from base, most distinct with the midrib, other nerves indistinct. Petiole glabrous, long ca. 2 cm appear grooved above ca. 0.2 cm in diameter, from nodes a little enlarged. Internodes glabrous, 11-12 cm long, terete, glabrous, light buff colored as are the petioles, some netted rooting along the stem.

Note. Not *H. pottsii* as leaf not Cordate based not palmately veined.

Description of the herbarium sheet which follows W 1024:

W 1024 as *Hoya samoensis* Seemann. 22 Oct. 1973. Savai'i Samoa. Vine with yellowish flowers, juice **not milky**, growing on trees in the forest near Asau. Elevation 10 m. 2 stems, 1 leafless, with a flower cluster the other with 3 pairs of leaves. Leaves glabrous, elliptic to broadly elliptic attenuate, apex acute, base obtuse, 5.3 - 6.8 cm long, 1.9 - 3.0 cm wide near the middle, 5 palmate nerves more distinct above than below, linear pair reaching near the apex, midrib not visible. Petiole may be grooved above, with basal semicircular gland, glabrous, 0.8 cm long 0.18 cm in diameter. Internodes 8.5 - 10 cm long, terete, glabrous, nodes a little enlarged, adventitious short rootlets along the stem. Peduncle 2.5 cm long, terete, glabrous, rachis enlarged, finely bracteated, round 0.7 cm long. Pedicels very filiform, light colored 1.7 cm long, terete, glabrous. Calyx broad, just reaches corolla sinuses. Corona glabrous, scales diamond shaped, outer apex acute beyond the corolla sinuses, dorsal keeled.

Note: Not any described Samoan species, **clear sap**. Not H. samoensis, elevation too high, not triplinerved, peduncle too short.


PLANTS OF SAMOA
Coll.
No.
Date


PLANTS OF SAMOA
Coll.
No.
Date

Description of the Herbarium sheet above W 1046:

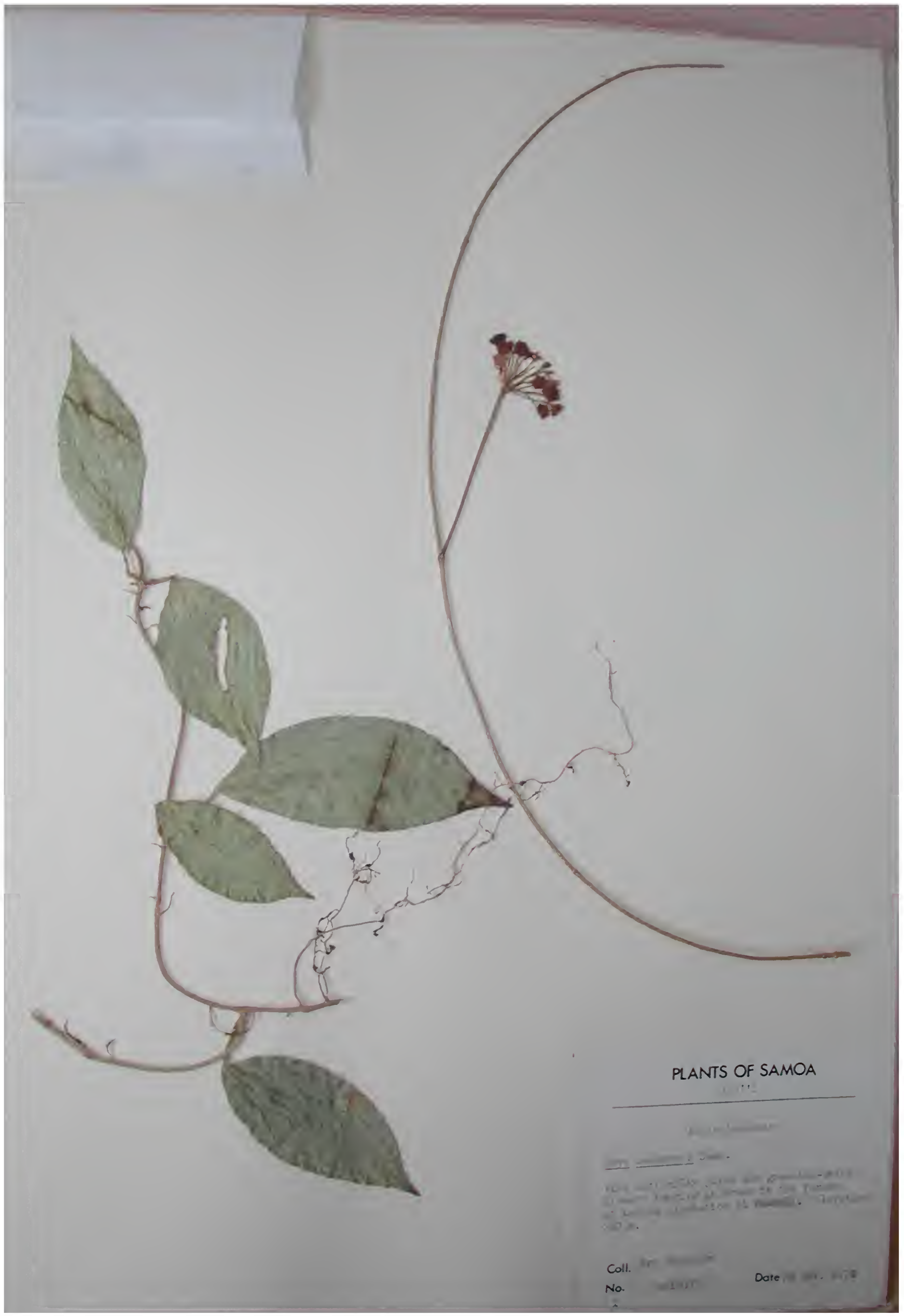
Hoya samoensis Seem. 23 Oct. 1973 Savai'i, Samoa. Vine in fruit with milky juice, hanging from a tree in the forest beside the road, inland from Asau. Elevation 360 M. 1 stem 7 leaves, 8 pods from one peduncle. Leaves ovate-elliptic attenuate, glabrous, thin, apex acute base narrowing obtuse 5 - 5.7 cm long x 2.4 - 2.5 cm widest below the middle, 5 basal nerves palmate) visible on the inside on both surfaces. Petioles relatively thick 0.9- 0.9 cm long, grooved above, glabrous with a circular gland at the blade. Internodes 10 - 11 cm long x 0.2 cm in diameter. Peduncle not quite the diameter of the stem, brown colored, terete, glabrous, 6.7 cm long. Pedicels 2 cm long, terete, glabrous, with small calyx at the end. Pods linear 12 -13 cm long apically curved, black.

Note: Most likely correct, elevation OK.

Description of the Herbarium sheet below W 1237

W 1237 as *Hoya samoensis* Seemann. 29 Nov. 1973. Savai'i, Samoa. Vine with milky juice and greenish white flowers hanging in trees in the forest at Letolo plantation at Palauli. Elevation 200m. Envelope with ca. 12 flowers; 2 stems 1 with peduncle & cluster, the other 4 leaves, long rooting and short adventitious roots along the stem of latter branch. Leaves glabrous, ovate-elliptic attenuate, apex acute, base narrowly rounded. 5.5 cm long & 2.3 - 3.4 cm widest, nerves 5 palmate, to apex anastomosing, visible upper more than lower surface, widest just below the middle. Petiole 0.7 - 1 cm long, glabrous, grooved above, not filiform. Internodes 7.5 - 10.5 cm long, terete, glabrous, 0.1 cm in diameter. Peduncle 5.5 cm Pedicels 1.4 cm long, terete, glabrous. Calyx relatively large. Flowers rotate, corolla small; corona may reach the sinuses, outer apex sharply acute, inner slightly beaked.

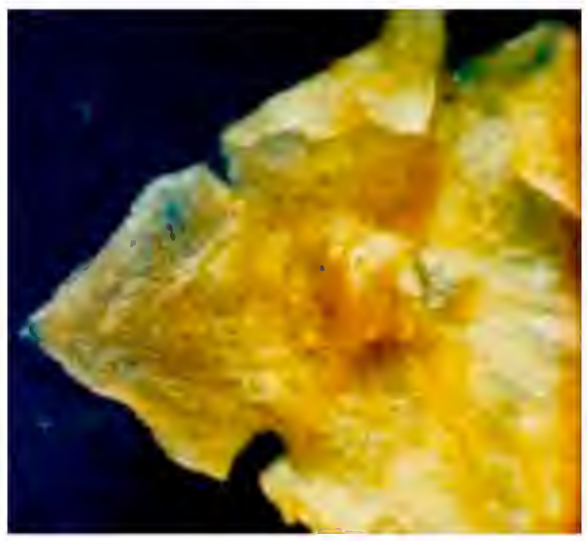
Note: Most likely correct, elevation OK.


PLANTS OF SAMOA
Coll.
No.
Date

Photomicrographs follow:

View of the pedicel and calyx on the flower enlarged about 8X. Pedicel is glabrous, terete, (here) translucent 0.7 cm in diameter tapering larger as it approaches the calyx. Sepals extend only1/2 way to the corolla sinuses.

Inside view of the calyx and pedicel enlarged about 8X. Sepals are rather broad 0.16 cm at the widest 0.16 cm long; 0.20 cm long to the center. I did not observe any ligules. Ovaries are narrowly dome shaped 0.10 cm tall and the base pair 0.08 cm wide.



Corolla outside view enlarged about 8X. Outside glabrous. Central collar 0.10 x 0.08 cm opening, and 0.05 cm tall.

Sinus - sinus	0.32 cm
Sinus - center	0.25 cm
Sinus - apex	0.55 cm
Widest	0.45 cm
Apex - center	0.65 cm

Top view of the flower enlarged about 8X. The corona is star shaped, glabrous, the outer apex acute, exceed the corolla sinus, center raised. Inner lobe very short, does not reach the center.

Apex- apex	0.33 cm
Apex - center	0.37 cm
Widest	0.17 cm
Retinaculum-ret.	0.07 cm
Ret. - center	0.06 cm
Anther wing - aw.	0.15 cm
Aw. - center	0.15 cm

Bottom view of the corona enlarged about 8X. This side is channeled and extends almost to the central column. Column is 0.05 cm tall. Surfaces are longitudinally sulcate.

Side view of the coronal scale enlarged about 16X. Inner lobe raised outer lobe slightly curved down, glabrous, longitudinally sulcate. Anther wings are deeply scythe shaped.

Front and side view of the retinaculum enlarged about 165X. The translators are fiddle shaped larger at the outer apex.

Pollinia enlarged a little over 100X. The caudicle is attached on the lower apex. The black arrow is 0.10 mm long and the base 0.05 mm and the stem 0.02 mm wide.

Pollinarium enlarged about 165X. Long pollinia and a very small retinaculum.

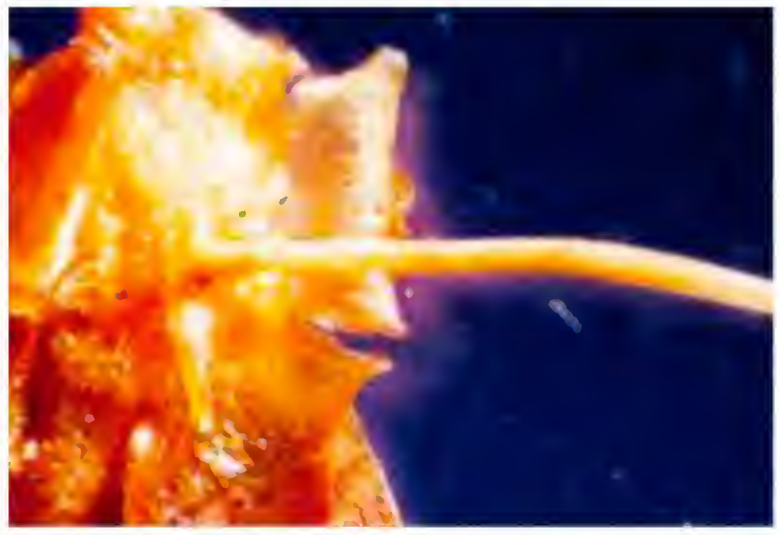
Pollinia		
	length	0.60 mm
	widest	0.18 mm
Retinaculum		
	length	0.10 mm
	shoulder	0.07 mm
	waist	0.04 mm
	hips	0.05mm
	extensions	0.04 mm
Translators		
	length	0.08 mm
	depth	0.03 mm
Caudicle bulb		
	diameter	0.06 mm

Description of the following herbarium sheet W 1297:

W 1297 as *Hoya samoensis* Seemann det. *Hoya pottsii* Traill, 15 Jan 1974. Ta'u, Samoa. Vine with milky sap & greenish white flowers climbing in a tree on the compound of the high school. 1 stem 2 pr. long leaves, 1 globose cluster 7 1 pod. 37 flowers. Leaves glabrous, broadly ovate elliptic, edges undulate, glabrous, apex attenuate to apiculate acute, base obtuse, nerves 5 palmate visible on both surfaces central ones extend to near the apex, anastomosing, opposite; 6.7 - 9.7 cm long 2.3 - 4.8 cm widest near the middle. Petiole long medium heavy, glabrous, 1.6 - 1.8 cm long ca 0.15 cm, in diameter, same color (buff) as the stem. Internodes Glabrous, one 13 cm long. nodes not much enlarged. Peduncle 10 cm long, terete, glabrous, 1/2 stem diameter. Pedicels 2 cm long, filiform, terete, glabrous. Corolla reflexed, glabrous ?, cut more then half way. Corona glabrous, lobes diamond shaped exceed sinuses of corolla, outer apex sharply acute, inner shortly dentate, dorsal concave in the middle, with small forward umbo. Pod linear curved 14.8 cm long, narrow, apex narrowing, base with attached calyx; peduncle.

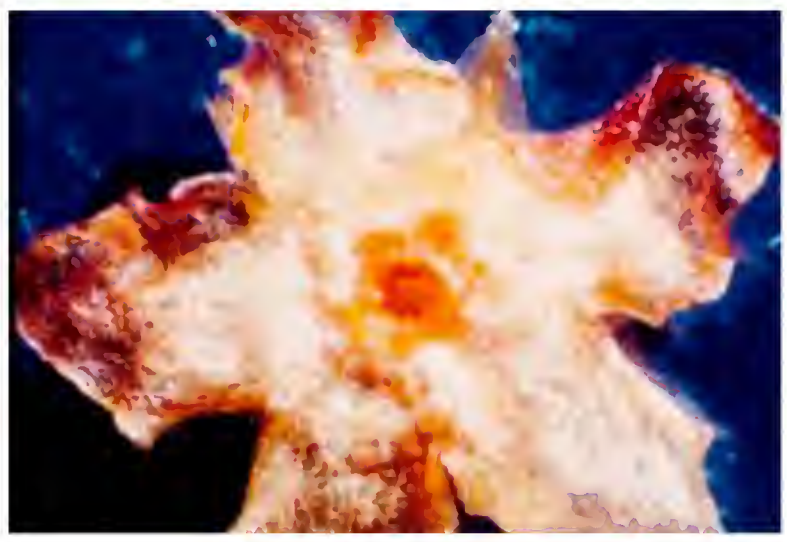
Note: Not *Hoya potsii* as leaved triplinerved, leaf bases not cordate, I would not call these petioles short nor "very thick". Not *H. samoensis*, too many flowers per cluster, petioles too long, peduncle too long, reflexed corolla.


PLANTS OF SAMOA
Coll.
No.
Date



View of the corolla with the calyx and pedicel attached enlarged about 8X. Pedicel glabrous, terete, 2 cm long x 0.45 cm in diameter. Sepal apex nearly reaches corolla sinuses. Corolla outside glabrous, deeply cut.

Pedicel and calyx enlarged about 8X. Domed shaped pair of ovaries showing. Calyx is glabrous, thin, with striate vascular channels visible. Sepal sinuses have linear ligules present, 0.18 cm long 0.20 from apex to center.



Outside surface of corolla enlarged about 8X. This surface is glabrous. Corolla is deeply cut, (more than half way). Corolla lobes are very wide just above the sinuses, as in Vahl's Sperlingia verticillata, 0.40 cm

Sinus - sinus	0.25 cm
Sinus - center	0.23 cm
Sinus - apex	0.40 cm
Widest	0.40 cm
Apex - center	0.60 cm

so flower flattened is 1.20 cm in diameter.
Central collar projects below and edges are thickened, 0.15 cm x 0.10 cm oval in shape.

Corolla inside view enlarged about 8X with corona attached. Corolla inside is pubescent. Coronal apexes exceed the corolla sinuses, is basically diamond shaped, inner lobes are short and do not reach the center, outer apex acute, dorsal edges sharp, centrally somewhat concave with a linear ridge. Widest a little inward from the middle.

Top view of the corona enlarged about 8X. Surface is glabrous. Dorsal longitudinally sulcate.

Apex - apex	0.35 cm
Apex - center	0.40 cm
Widest	0.20 cm
Anther wing - aw	0.16 cm
Retinaculum - ret.	0.09 cm
Ret. - center	0.09 cm
Aw. - Center	0.16 cm

Bottom view of the corona enlarged about 8X. Channeled down the center, Lobes are widest inward from the center.

Side view of a coronal scale enlarged about 8X. Picture not clearly focused but anther wing is deeply curved, anther exceeds the inner lobe, scale depth is thin, possibly from drying.

Top view of corona enlarged about 8X. One scale removed to show the stylar crown in the center. It is a simple raised column with a little fuzziness to the apical apex. (it is the light yellow spot in the center).

Pollinarium with one pollinia lost. Enlarged about 165 X. The dark arrow is 0.1 mm long. The pollinium has a pellucid edge as all hoya species have, The translators are short, the retinaculum had well developed shoulders and waist.

Pollinia		
	length	0.50 mm
	widest	0.20 mm
Retinaculum		
	length	0.15 mm to crotch
	shoulder	0.11 mm
	waist	0.04 mm
	hip	0.07 mm
	extensions	0.05 mm
Translatore		
	length	0.10 mm
	depth	0.024 mm
Caudicle		
	bulb diam.	0.05 mm

Enlarged view of the retinaculum, showing translators somewhat deteriorates and the caudicles slightly collapsed. Retinaculum is about average sized for hoya species.


PLANTS OF SAMOA
Coll.
No.
Date

Description of the herbarium sheet above W 1460:

W 1460 as *Hoya samoensis* Seemann in *H. pottsii* folder. 21 Jan. 1974 Tutuila, Samoa. Vine hanging in trees, fruit green, in the canyon behind the LBJ Hospital at Faga'alu. 1 long coiled stem and one peduncle with thickened pedicels and one pod. Leaves glabrous, broadly elliptic attenuate, large 7 - 10 cm long & 3.5 - 4.3 cm at the widest, apex subacute, base obtuse; nerves somewhat obscure but 3 palmate, netted and anastomosing, surface wrinkled (relatively thick). Petiole 1 - 1.2 cm long, grooved above, glabrous, color of stem (light) 0.1 cm in diameter. Internodes 12.5 - 13.5 cm long, terete, granulose-pustulate, nodes barely enlarged, some adventitious rooting. Peduncle 7.6 cm long, terete, glabrous, ca. 0.1 cm in diameter, rachis irregular; the pedicels from fascicled circular protuberances, certainly not umbellate, here 0.5 cm long & 0.3 cm wide. Pedicels glabrous, not filiform but may be due to pod development, 2 cm long, one with pod darker color; pod linear, slightly curved, apex acute 11.7 cm long with calyx at the base.

Note: Same sp. as W 1297. Unknown.

Description of the herbarium sheet that follows W 1506:

W 1506 as *Hoya samoensis* Seemann 5 Feb. 1974 Upolu, Samoa. Vine with milky juice and green fruit and flowers, hanging from trees along the edge of Lake Lano Ataata, elevation 600 m. 1 stem and branch with very long peduncle, two pairs of leaves. Envelope with many flowers. Leaves glabrous, succulent 3 very distinct nerves especially on the lower surface lighter color, blade 6 - 7 cm long, 2 -2.6 cm wide; wrinkled elliptic attenuate, apex narrowly cuneate. Petiole terete, glabrous, grooved, with prominent semi circular gland at base, 1 cm long x 0.3 cm in diameter, same color as the stem and peduncle. Internodes glabrous, 14 cm long, terete, heavy, 0.3 cm in diameter, occasional adventitious roots, nodes only slightly enlarged. Peduncle very long 9.7 cm, surface rough, granulose-pustulate, otherwise terete, glabrous 0.15 cm in diameter; rachis 2.3 cm long, peduncles from fascicled bracteoles and one branched peduncle 2.5 cm long. Pedicels filiform light, glabrous, terete, colored yellow-reddish 2 cm long, 15 flowers. Corolla reflexed, outside, glabrous, inside puberulous, darker, cut about 2/3, wide above the sinuses. Corona glabrous, lobes reach sinuses, upright, light colored, outer apex turned over sub acute, inner lobe short, dentate, reaches the center, dorsal concave, broadest 2/3 way out.

Note: possibly correct.

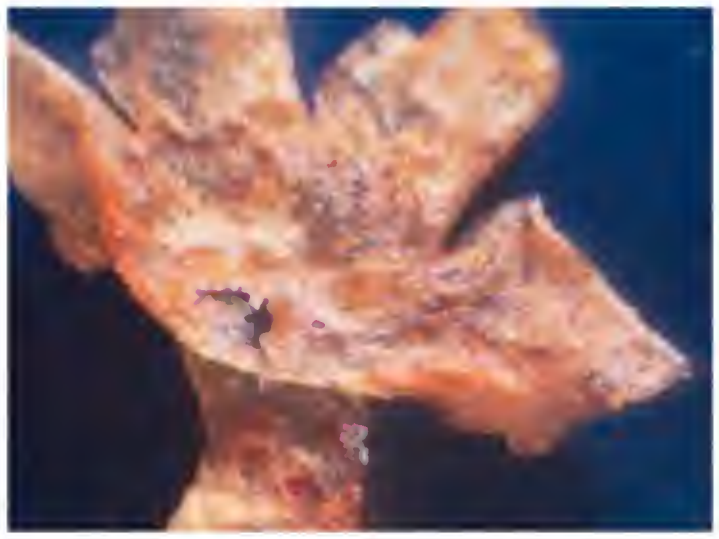

PLANTS OF SAMOA
Coll.
No.
Date

Poor picture of the pedicel & calyx enlarged about 8X. Outside surface of the sepals glabrous. Pedicel is terete, glabrous here 6 cm long, 0.15 in diameter. Ovaries not showing are columnar shaped. I could not see ligules.

Corolla outer surface enlarged about 8X, this surface is glabrous, here reflexed with very wide lobes just above the sinuses of the corolla, note rolled under lobes (conduplicate), as with *Hoya mindorensis* Schlechter.

Sinus to sinus	0.22 cm
Sinus - apex	0.40 cm
Sinus - center	0.20 cm
Apex - center	0.60 cm flower flattened is 1.20 cm in diameter.
Widest	0.40 cm

Collar thickened 0.05 cm tall.



Inside surface of the corolla enlarged about 8X. This surface is pubescent, best seen on the lower right lobe. Lobe apexes are acute.

Top view of the corona enlarged about 8X. Lobes not as long as in W 1297 and widest near the center, outer apex acute, inner apex nearly reach the center. Dorsal and sides longitudinally sulcate.

Apex - apex	0.40 cm
Apex - center	0.42 cm
Widest	0.21 cm
Anther wing - aw.	0.19 cm
Retinaculum - ret.	0.07 cm
Ret. - center	0.05 cm
Aw. - center	0.18 cm

Anther wings are thick, blunt and extended. The anther wings are thick and blunt and extended. The underside is channeled with a column thickened and 0.05 cm tall.

Side view of a coronal scale enlarged about 12X. Inner lobe very short and raised a little. Anther wing is deeply curved and thickened.

Pollinarium enlarged about 165X. The pollinia are shrunken a little, most likely form drying, right and lower portions folded inward in the lower portion.

Pollinium		
	length	0.54-62 mm
	widest	0.20 mm
Retinaculum		
	length	0.15 mm
	shoulder	0.14 mm
	waist	0.08 mm
	hip	0.10 mm
	extensions	0.03 mm
Translator		
	length	0.13 mm
	depth	0.023 mm
Caudicle		
	bulb diam.	0.06 mm

Not as enlarged as the above picture.

Another pollinarium showing the same shriveling but a better view of the retinaculum extensions and also the caudicle bulbs.

Description of the herbarium sheet that follows W 1985:

1985 as *Hoya pottsii* Trail, 2 July 1964, C. R. Long. Tutuila, Samoa. No flowers, 1 long stem 13 leaves, bases cuneate, nervation 3-5 tuplinerved, more visible on the upper surface, midrib not prominent, blades elliptic attenuate, apex sharp but not acute, 8 - 9.5 cm long, 3 cm widest near the middle. Petioles long mostly 1.5 cm or slightly longer, glabrous, same color as the stem and leaves, grooved above with basal glands, v shaped. Internodes 7-8 cm long, terete, glabrous, 0.2 cm in diameter, rooting adventitious, some long & branching and re-branching, netted.

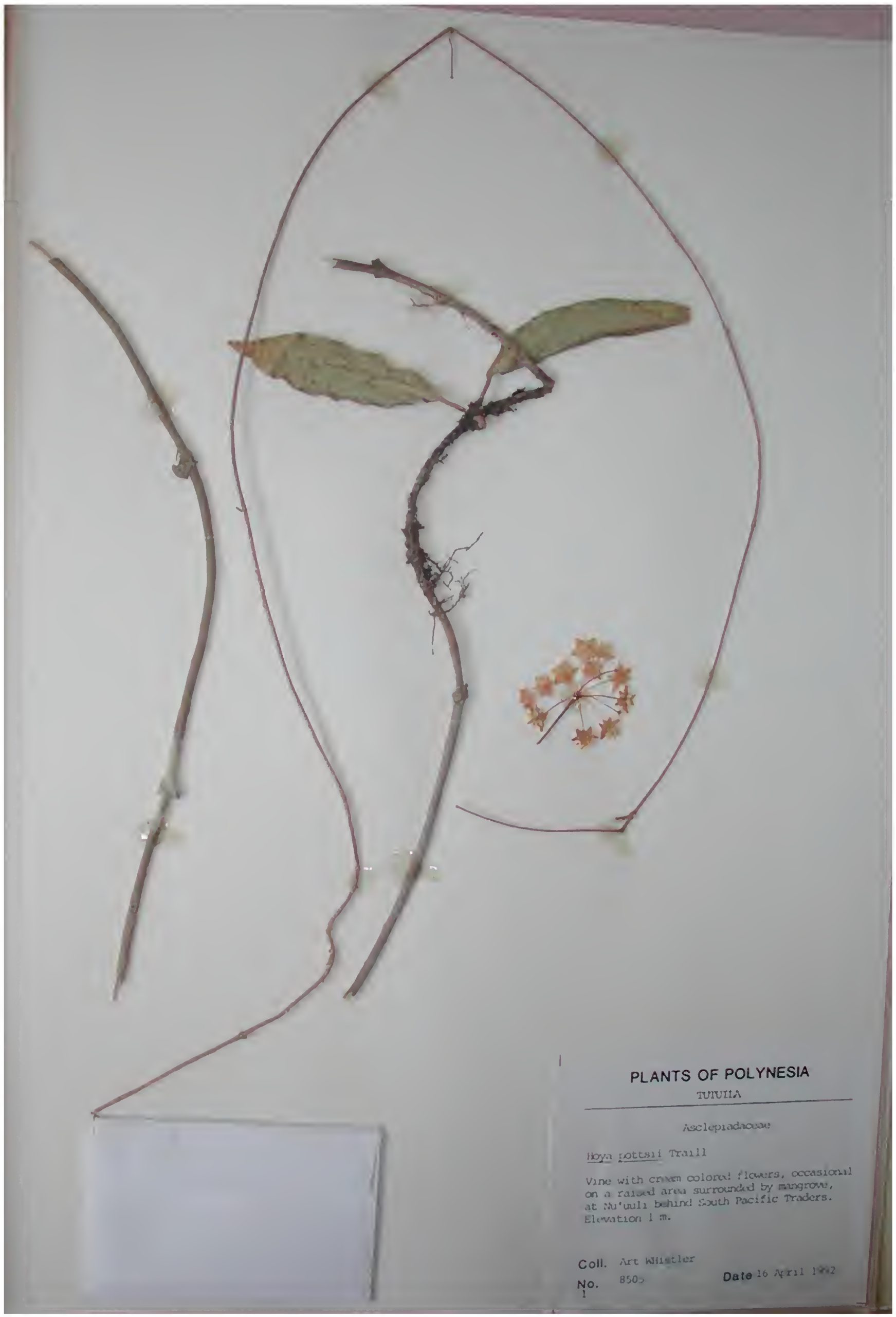
Note: not *H. pottsii*, leaf tuplinerved not palmate, altitude too high. More likely *H. samoensis.*

Description of the herbarium sheet second below:

8505 as *Hoya pottsii* Trail, Tutuila, Samoa. 16 April 1992. Vine with cream colored flowers, occasional on a raised area surrounded by mangrove at Nu'uuli behind South Pacific Traders,. Elevation 1 m.. 1 bare stem, 1 with 1 pair of leaves, 1 long stem with detached cluster of 13 flowers. Envelope of 5 flowers. Leaves , glabrous, thick wrinkled, elliptic, trinerved indistinct 6.8 cm long , ca. 2 cm wide, apex acute, base cuneate. Petiole glabrous, thick 1 cm long (cannot see a groove above). Internodes 9 - 10 cm long (thin to thick) enlarged nodes, glabrous, 0.2 cm in diameter, rooting. Peduncle glabrous, may be broken off. here 1.7 cm long, terete, 12 pedicels, rachis with bracts. Pedicels glabrous, filiform, 1.3 cm long, terete. Calyx small 1/2 way to the corolla sinuses. Corolla reflexed, cut more than half way, broad above the sinuses, glabrous outside, inside ?. Corona glabrous, lobes exceed the corolla sinuses, outer apex acute raised (not recurved at apex) inner apex raised a little.

Note: Not *H. pottsii*, leaf venation triplinerved not palmate leaf bases not cordate but cuneate. May be *H. samoensis.*


SAMOAN
PLANTS OF THE HAWAIIAN ISLANDS
Flora of Samoa
Coll C R Long
No 1455
TUTUILA


PLANTS OF POLYNESIA
TUVUILA
Asclepiadaceae
Hoya pottsii Traill
Vine with cream colored flowers, occasional on a raised area surrounded by mangrove, at Nu'uuli behind South Pacific Traders. Elevation 1 m.
Coll. Art Whistler
No. 850
Date 16 April 1962

Calyx on outside of the flower corolla enlarged about 8X. The Pedicel is terete, glabrous, 1.5 cm long, filiform. The sepals are large and nearly reach the corolla sinuses. Corolla outer surface is granulose, glabrous, lobes are deeply cut with acute apexes and wide lobes just above the sinuses.

Pedicel and inside surface of the pedicel enlarged about 8X. Sepals relatively large, membranous, ligules present of same color as the sepals, difficult to detect. Apexes acute.

Center to apex	0.20 cm
Apex - apex	0.18 cm
Widest	0.10 cm wide at the base.

Corolla outside surface enlarged about 8X. This surface is glabrous pustulate, reflexed, deeply cut with a central collar, a little thickened and raised below.

Sinus - sinus	0.30 cm
Sinus - center	0.25 cm
Sinus - apex	0.40 cm
Apex - center	0.58 cm so the flower flattened is 1.16 cm in diameter.
Widest	0.34 cm

Inside view of the flower enlarged about 8X. The coronal lobes exceed the corolla sinuses but do not touch in the center. Corolla inside surface is pubescent. Apexes acute, wide above the sinuses.

Top view of the corona enlarged about 8X. Surfaces are glabrous. Outer apex acute, inner apex short and most likely dentate, dorsal slightly concave, outer edges sharp.

Apex - apex	0.36 cm
Apex - center	0.40 cm
Widest	0.15 cm out from the middle.
Anther wing - aw.	0.17 cm
Retinaculum - ret.	0.11 cm
Aw. - center	0.14 cm
Ret. - center	0.06 cm

Anther wings are with thick sides and projected.

Bottom view of th4 corona enlarged about 8X. The lobes are channeled only to the sinuses, Note the anther wing thickness and slight projection. Outer apex very acute. Column in center slightly thickened ca. 0.05 cm tall.

Coronal lobe side view enlarged about 16X. The inner lobe is very short. Anther wing is very deeply sceyth shaped and the scale is relatively deep.

Pollinarium enlarged about 150X

Pollinia		
	length	0.40 mm
	widest	0.22 mm
Retinaculum		
	length	0.13 mm
	shoulder	0.11 mm
	waist	0.09 mm
	hip	0.10 mm
	ext.	0.05 mm
Translator		
	length	0.10 mm
	depth	0.05 mm
Caudicle		
	bulb diam.	0.07 mm

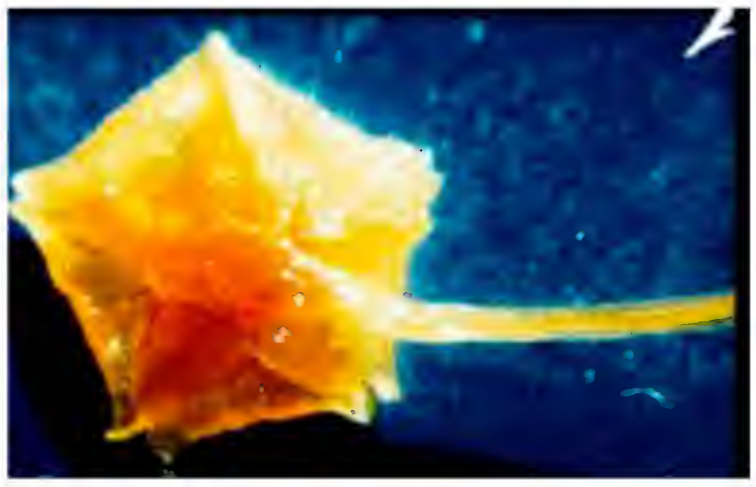

PLANTS OF POLYNESIA
TUTUILA
Asclepiadaceae
Hoya pottsii
Vine with cream colored flowers, sap not noticeably milky, occasional, but only one seen in flower, in the ridge forest on Tiatiaula ridge west of Vatia. Elevation 180 m.
Coll Art Whistler
No. 4089
Date 8 Jan. 1963

Description of the Herbarium sheet above 9089:

9089 as *Hoya pottsii* Traill, 5 Jan, 1993 Tutuila, Samoa. Vine with cream colored flowers, sap not noticeably milky, occasional, but only one seen in flower, in the ridge forest on Tiataula ridge east of Vatia. Elevation 180 m. 2 stems 5 leaves, 1 flower globose cluster. 1 stem with adventitious roots all along. Leaves glabrous, broadly ovate-lanceolate, shortly attenuate, apex acute, base rounded but not cordate, 5.5 - 6.5 cm long 3 - 3.5 cm widest nearer the base, nervation palmate 5 distinct on both surfaces, same color as the leaf, secondary nerves some looping near the margins, primary nerves extend to near the apex. Petiole glabrous, not thin 1.5 cm long probably grooved above, same color as the stem, circular gland at the attachment above. Internodes glabrous, mostly 8 cm long, terete, 0.2 cm in diameter, roots up to 3 cm long, fine, nodes not much enlarged. Peduncle glabrous, straight, 4.5 cm long, terete rachis a little longer, fascicles. Pedicels, glabrous, very fine, terete, 34 flowers. 2 cm long, light colored.

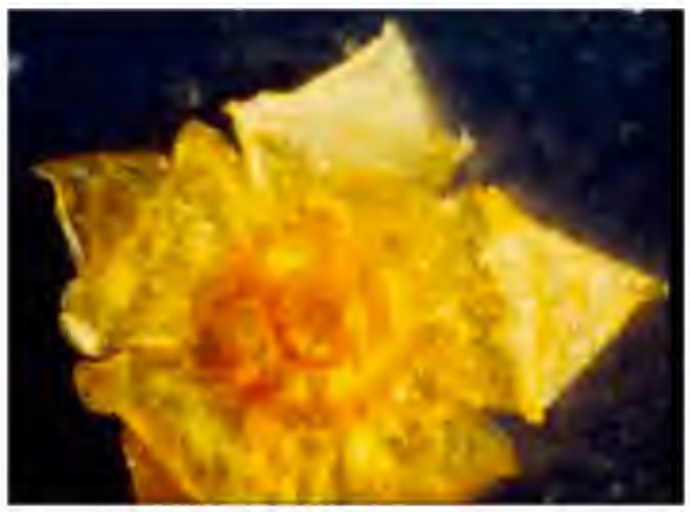
Note: not *H. pottsii*, leaf triplinerved not palmate and base not cordate. Flower relatively small, Calyx large, reaches sinus of corolla. **Most likely a new species.**

Micro Photos of flower from sheet 9089:



Outside view of the flower enlarged about 8X. Pedicel is glabrous, terete, short, 1.05 cm long 0.05 cm in diameter, Calyx is very large, outside granulose, inside smooth, sepal apex reaches the corolla sinuses. Flower not yet opened.

Calyx: Left outside view, right inside view enlarged about 8X., glabrous. Sepals 0.13 cm long, 0.13 cm at the widest, near the base. One ligule seen.



Outside view of the corolla enlarged about 8X. This surface is glabrous, central ring raised (convex).

Sinus - sinus	0.25 cm
Sinus - center	0.21 cm
Sinus - apex	0.38 cm
Widest	0.33 cm
Apex - center	0.55 cm

So the flower diameter flattened is 1.10 cm Lobes widest out from the sinus area.

Inside view of the flower enlarged about 8X. Surface is finely and evenly pubescent. Coronal apex is acute. Inner lobe long apiculate, dentate, do not reach the center. Inner lobe can be seen as yellow linear line near the center

Top view of the corona enlarged about 8X. Outer apexes seem to be emarginate. Lower surface channeled.

Apex - apex	0.20 cm
Apex - center	0.23 cm
Widest	0.10 cm near the inner lobe.
Anther wing - aw.	0.15 cm
Retinaculum - ret.	0.08 cm
Aw. - center	0.13 cm
Ret. - center	0.05 cm

Anther wings are very bulbous

Several retinacula enlarged about 82X. Head is long with shoulders well down, waist only slightly narrower, and hips a little extended.

length	0.20 mm
shoulder	0.13 mm
waist	0.09 mm
hip	0.10 mm
extensions	0.08 mm

Pollinia here still in the anther sack enlarged about 165 X. The length is ca. 0.55 mm long and 0.20 mm widest.

Compilation of data on this group of herbarium sheets

Calyx comparisons

	Sepals length x width	to Corolla sinuses	Ligules
W1237	0.16 x 0.16 cm	1/2 +	none seen
W1297	0.18 x cm	almost to sinus	5 ligules
W1506			not seen
8505	0.18 x 0.10 cm	reach sinus	5 ligules
9089	0.13 x 0.13 cm	reach sinus	1 long ligule

Corolla Comparisons

	Sinus - Center	Sinus - sinus	Sinis - apex	Widest	Apex - center
W1237	0.25 cm	0.32 cm	0.55 cm	0.45 cm	0.65 cm
W1297	0.23 cm	0.25 cm	0.40 cm	0.40 cm	0.60 cm
W1506	0.20 cm	0.22 cm	0.40 cm	0.40 cm	0.60 cm
8505	0.25 cm	0.30 cm	0.40 cm	0.34 cm	0.58 cm
9089	0.21 cm	0.25 cm	0.38 cm	0.33 cm	0.55 cm

Corona comparisons

	Apex - apex	Apex - center	Widest	Aw. - aw.	Ret. - ret.
W 1237	0.33 cm	0.37 cm	0.17 cm	0.15cm	0.07 cm
W 1297	0.35 cm	0.40 cm	0.20 cm	0.16 cm	0.09 cm
W 1506	0.40 cm	0.42 cm	0.21 cm	0.19 cm	0.07 cm
8505	0.36 cm	0.40 cm	0.15 cm	0.17 cm	0.11 cm
9089	0.20 cm	0.23 cm	0.10 cm	0.15 cm	0.08 cm

Vegetative comparisons:

	W 206	**W 1024**	**W 1237**
Leaves	10.0 - 11.5 x 4.5 - 4.8 cm	5.3 - 6.8 x 1.9 - 3.0 cm	5.5 x 2.3 -3.4 cm
Petiole	2 cm	.08 cm	0.7 - 1.0 cm
Internodes	11 - 12 cm long	8.5 - 10 cm long	7.5 - 10.5 cm

Peduncle		2.5 cm	5.5 cm
Pedicel		1.7 cm	1.4 cm
	W 1297	**W 1460**	**W 1506**
Leaves	6.7 - 9.7 x 2.3- 4.8cm	7 - 10 x 3.4 - 4.3 cm	6 - 7 x 2 -2.6 cm
Petiole	1.6 -1.8 cm	1 - 1.2 cm	1 cm x 0.03 cm
Internodes	13 cm	12.5 - 13.5 cm	14.0 cm
Peduncle	10 cm	7.6 cm	9.5 cm
Pedicel	2 cm	2 cm	2 cm
	1985	**8505**	**9089**
Leave	8.9 x 3 cm	6.8 x 2 cm	2.5 - 6.5 x 3 - 3.5 cm
Petiole	1.5 cm	1 cm	1.5 cm
Internodes	7 - 8 cm	9 - 10 cm	8 cm
Peduncle	9.5	5.1 + cm	4.5 cm
Pedicel	2	1.3 cm	2 cm

Pollinarium comparisons in mm

	W 1237	W 1297	1506	8505	9089
Pollinium					
length	0.60	0.50	0.55	0.40	0.55
widest	0.18	0.20	0.20	0.22	0.20
Retinaculum					
length	0.10	0.15	0.17	0.13	0.20
shoulder	0.07	0.11	0.14	0.11	0.13
waist	0.04	0.04	0.08	0.09	0.09
hip	0.05	007	0.10	0.10	0.10
extensions	0.04	0.05	0.03	0.05	0.08
Translator					
length	0.08	0.10	0.13	0.10	
depth	0.03	0.024	0.023	0.05	
Caudicle					
bulb diam.	0.06	0.05	0.06	0.07	

Samoan Hoya's Second Folder

List of sheets: (6)		Listed	Determined
W 2705	*	filiformis	peduncle and pedicel too long, pubescent inside, altitude too high.
W 3801	*	sp. nova ?	may be whistlerii, but not marginate & corolla with a raised 0.07 cm tall collar.
7605	*	sp. nov.	whistlerii
7989	*	sp. nov.	whistlerii
8798	*	sp. nov.	whistlerii
9456	*	sp. nov.	not any known.

None of these sheets have been identified as to species, except W 2705.

* **Sheets with flowers micro photographed and measured.**

Data and photos of flower parts of each sheet follows, for those sheets with loose flowers. Sheets have been reduced to scan and place in this file. Sheets are 11.5 " x 16.5 " in the natural state.

Data on herbarium sheet below:

W 2705 *Hoya filiformis* Rechinger. Vine with milky juice, climbing on trees on the trail from Fagasa Pass & Matafas; flowers white, lacking any red; elevation 350 m. 2 stems (1 with 3 pairs of leaves + peduncle with 8 pedicels 4 flowers) (1 with 3 pairs of leaves +1 and 2 burst seed pods. Leaves broadly ovate-elliptic, shortly attenuate a little rounded, base obtuse, venation pinnate 5 pairs anastomosing-reticulate, 4.5 - 5.5 cm long 2.5 - 3 cm at widest near the middle, glabrous, midrib inconspicuous. Petiole ca. 1 cm long, definitely grooved above, glabrous. Internodes 3.5 - 8.5 cm long, terete, glabrous, 0.2 cm in diameter, nodes just slightly enlarged. Peduncle 2.7 cm long, terete, glabrous, rachis bracteated, fascicled. Pedicels filiform, glabrous, 2 - 2.5 cm long. Calyx very small triangular. Corolla granulose , glabrous outside, inside finely pubescent, campanulate. Pods 1.5 cm long, narrow-linear, base with calyx attached, peduncle has enlarged a little, 2.7 cm long, seeds obovate, comose ca. 1.8 cm long, seeds and 3 flowers in the envelope.

Note: Not *H. filiformis*, Flower not glabrous inside. Not *H. chlorantha*, flower campanulate not flat, and peduncle persistent. Not *H. attenuata* leaves different. Not *H. whistlerii*, villous inside. Flower too small for *H. betchei*


PLANTS OF SAMOA
TUTUILA
Asclepiadaceae
Hoya filiformis Rech.
Vine with milky juice, climbing in trees on the trail from Fagasā Pass and Matafao; flowers white, lacking any red; elevation 350 m.
Coll. Art Whistler
No. W 2705
Date 2 June 1975

Photo from slide taken by Dr. Art Whistler

Micro photographs of sheet W 2705 follow:

No pedicel was available. Corolla outside view enlarged about 8X. Surface is granulose but glabrous. Central collar is darker and thickened, 0.08 cm x 0.10 cm opening, this protrudes below and inwardly also. Coronal lobes show impressions from underneath. lobes are cut more than half way.

Another view of the corolla outside showing the lobe apex enlarged about 8X.

Sinus - sinus	0.24 cm
Sinus - center	0.40 cm
Sinus - apex	0.55 cm
Widest	0.50 cm
Apex - center	0.80 cm

So flower diameter flattened is 1.60 cm

Inside view of the flower enlarged about 8X. Coronal lobes just reach the corolla sinuses. Coronal scales with long raised inner dentate lobe that reach the center; dorsal concave with long central raised ridge, edges sharp, outer lobe obtuse, surface longitudinally sulcate. Corolla villous or deeply pubescent. Glabrous under the corona.

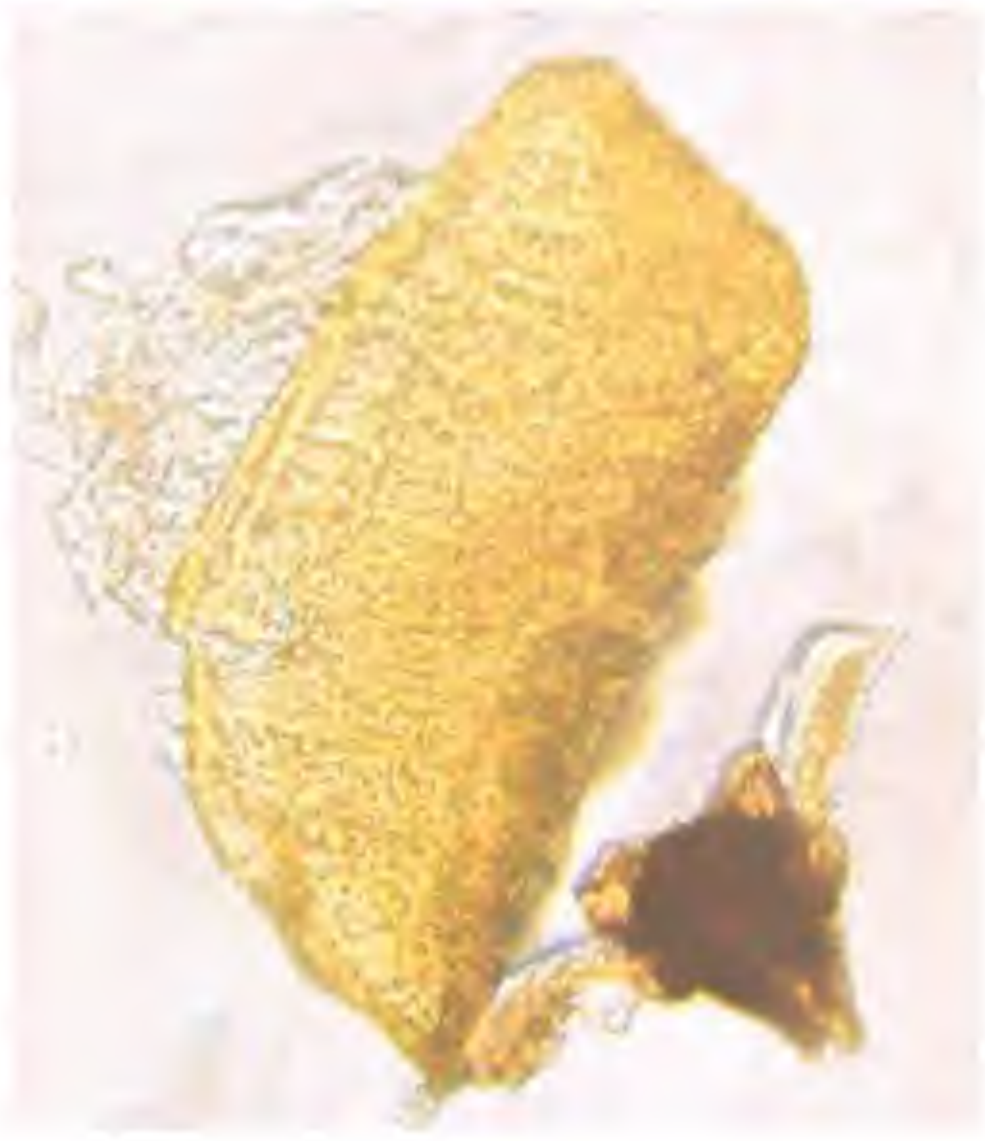
Bottom view of the coronal scales enlarged about 8X. Channeled with edges overlapping, longitudinally sulcate.

Apex - apex	0.35 cm
Apex - center	0.35 cm
Widest	0.16 cm

Side view of the coronal scale enlarged about 16X. Long dentate inner lobe is raised over the anther. Anther wings are narrowly scythe shaped; there is a shelf from there to the outer apex making the apex emarginate.

Pollinarium enlarged about 165X. The pollinium has germinated within the flower and the pollen tubes can be seen emerging along the pellucid edge of the pollinia. The retinaculum here is skewed so only a side view can be seen and the translators and caudicle are difficult to measure.

Pollinium		
	length	0.47 mm
	widest	0.21 mm
Retinaculum		
	length	0.15 mm
	shoulders	0.11 mm
	hips	0.10 mm
	waist	0.11 mm
	extensions	0.04 mm



Another pollinarium with a better view of the retinaculum and the translators. Caudicle still hidden but linear (collapsed) on the right hand translator. Here the focus does not show the long head of the retinaculum, one of the intricacies of getting precise measurements and depictions of the shape of 3 dimensional complex structural objects.

Translator		
	length	0.11 mm
widest	depth	0.05 mm

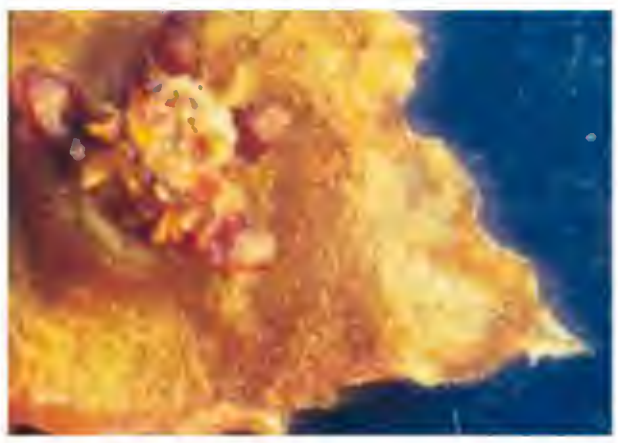
Structure is fiddle shaped in flat dimension. Pollen tubes in mass on left central side of pollinium.


Herbarium of the University of Hawaii, Honolulu
Hoya sp. nova?
Art Whistler
Date: Dec. 1990
PLANTS OF SAMOA
OLOSEGA
Asclepiadaceae
Hoya
Vine with white flowers and milky sap, climbing in trees in secondary forest at 200 m elevation.
Coll. Art Whistler
No. W 3801
Date 2 Dec. 1976
2

Micro photographs of sheet flower W 3801 follow:

Corolla outside view enlarged about 8X. Corolla surface is granulose but glabrous, centrally there is a well developed thin walled collar 0.07 cm tall, opening is 0.20 cm x 0 14 cm Lobes widen above the sinuses, apex is very shapely acute.

Sinus - sinus	0.42 cm
Sinus - center	0.43 cm
Sinus - apex	0.52 cm
Widest	0.52 cm
Apex - center	0.82 cm



Inside view of the flower enlarged about 8X. Corolla inside is puberulous. Corona is red, glabrous, and small with sway backed lobes, outer apex is obtuse and far from the corolla sinuses. Apex to sinus 0.20 cm Inner lobes are raised, spatulate, exceeded by the central anthers. Anthers bunched and crepe-like. Corolla is sunken under the corolla, less puberulous under the corona.

Bottom view of the corona enlarged about 16X. The lobes are channeled; anther wings are thick and waxy yellow. The central column is wide and flaring 0.18 cm at the widest centrally, 0.05 cm tall.

Side view of a coronal scale enlarged about16X. The inner coronal lobe is bent back and with a deep dip in the dorsal surface, which does not show in this photo.

Retinaculum and translators enlarged about 165 X.

Retinaculum

length	0.17 mm
shoulders	0.11 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.05 mm

Translator

length	0.13 mm
depth	0.03 mm

Pollinium enlarged about 165X. This structure did not remain with the caudicle and Retinaculum and may be skewed or flattened some. It appears to be distorted in the upper portion and the pellucid edge is barely visible.

Here the length is	0.44 mm
widest	0.18 mm

Data on sheet: above:

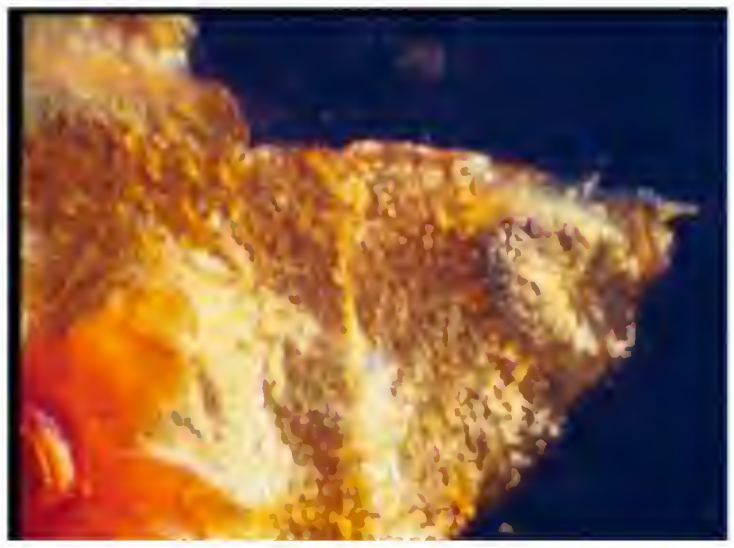
W 3801 Vine with white flowers & milky sap, climbing in trees in secondary forest at 200 m. elevation, Olosega, Samoa. 2 stems twining together, 1 pair of leaves and 2 singles, 1 flower cluster, 10 pedicels and 5 flowers. Leaves 5.5 cm x 2.5-3 cm wide, ovate-elliptic shortly attenuate, base obtuse, glabrous, midrib protrudes below, pinnate-anastomosing venation. Internodes mostly 14 cm long, nodes enlarged, glabrous, thick 0.3 - 0.4 cm in diameter. Peduncle heavy 4 cm long 0.15 cm in diameter, enlarged toward rachis divided into 2 apically, bracteate. Pedicels filiform ca. 2 cm long. Calyx very small, sepals narrowly triangular. Corolla rugose outside.

Note: probably H. whistlerii with very small corona.


PLANTS OF SAMOA
TA'U
Asclepiadaceae
Hoya (sp. nova?)
Vine with white flowers and milky sap, common in the forest on the east rim of Luatele Crater at the northeast corner of the island, 350 m elevation.
Coll. Art Whistler
No. 7605
2
Date 19 Dec. 1990

Following are Micro Photos of Herbarium sheet flowers 7605:

View of the outside of the corolla enlarged about 8X. No pedicel was available to photograph. Flower is large, outside surface is glabrous. Corona showing through the treated flower, central collar is darker colored and much thickened walls, opening 0.13 cm x 0.12 cm (oval shaped) and 0.05 cm tall, the area around in is a little depressed.



Corolla outside at the lobe area. The lobe is cut more than half way and the apex is acute.

Sinus - sinus	0.67 cm
Sinus - center	0.53 cm
Sinus - apex	0.65 cm
Widest	0.70 cm
Apex - center	1.00 cm

The flower flattened is 2.00 cm in diameter.

Top view of the flower enlarged about 8X. Corolla inside is pubescent. Corona is small and darker colored, inner lobes are spatulate and raised do not reach the center, outer apex is obtuse; dorsal surface is concave with sharp margins, surfaces are glabrous and longitudinally sulcate. Outer apex does not come near the corolla sinus. A lower shelf runs from the anther wings to the near the outer apex.

As above but showing the corolla lobe and coronal relationship to the corolla sinus.

Corolla inside view with the corona removed, enlarged about 8X. Collar protrudes here (as well as it does on the underside, edges are much thickened. There is less pubescence under the coronal area (central).

Corona top view enlarged about 8X.

Apex - apex	0.30 cm
Apex - center	0.35 cm

Did not make other measurements.

Bottom view of the corona enlarged about 8X. The lobes are channeled almost to the central column. The lower scale side lobes form the sides of the groove; sides are longitudinally sulcate.

Side view of the corona enlarged about 16X.
Inner lobe here is long, outer apex rounded with lower side lobe almost reaching the outer apex.

Description of the herbarium sheet:

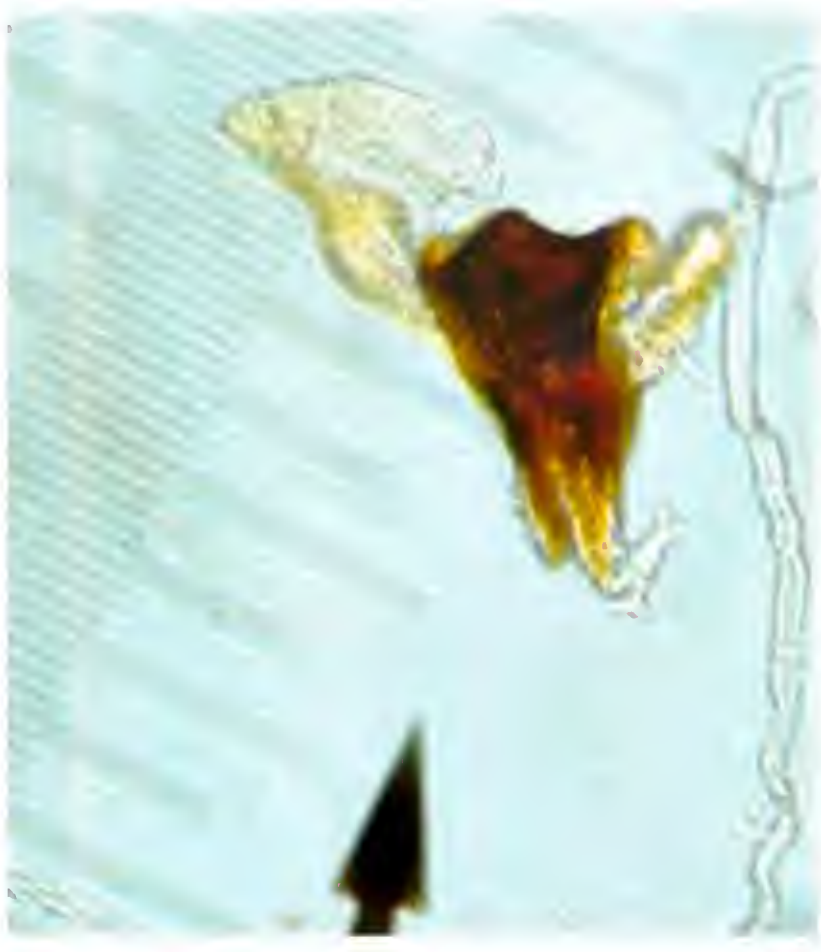
7605 Vine with white flowers 7 milky sap, common in the forest on the east rim of Luatek Crater at the northeast corner of the island, 350 m elevation, Ta'u, Samoa. 1 stem 3 pairs of leaves + 1. Heavy stem 1 cluster with 7 pedicels, envelope with 3 flowers. Leaves glabrous, elliptic-ovate, apex tapered attenuate, base obtuse 5.5 - 6 cm long x 2.5 - 3 cm widest nearer base, venation obscure pinnate (base narrowly cordate). Petioles very long, 1.5 cm, grooved above, glabrous. Internodes 0 - 11 cm long, glabrous, nodes not much enlarged, 0.3 cm in diameter. Peduncle fine 4.5 cm long, terete, glabrous; rachis very fine bracteated, round, ca. 1 cm long, glabrous. Pedicels filiform, terete, glabrous,

2.7 cm long. Calyx extremely small. Corolla cupped, glabrous outside, finely pubescent inside. Envelope with 3 flowers. **H. whistlerii**

Pollinium enlarged about 165 X.

length	0.47 mm
widest	0.20 mm

Retinaculum on the left with translators attached enlarged about 100X. The object is not laying flat, a little at an angle.



Retinaculum also enlarged about 165X., again skewed with translator and caudicle on left side.

Retinaculum

length	0.17 mm
shoulders	0.14 mm
waist	0.06 mm
hip	0.09 mm
extensions	0.04 mm

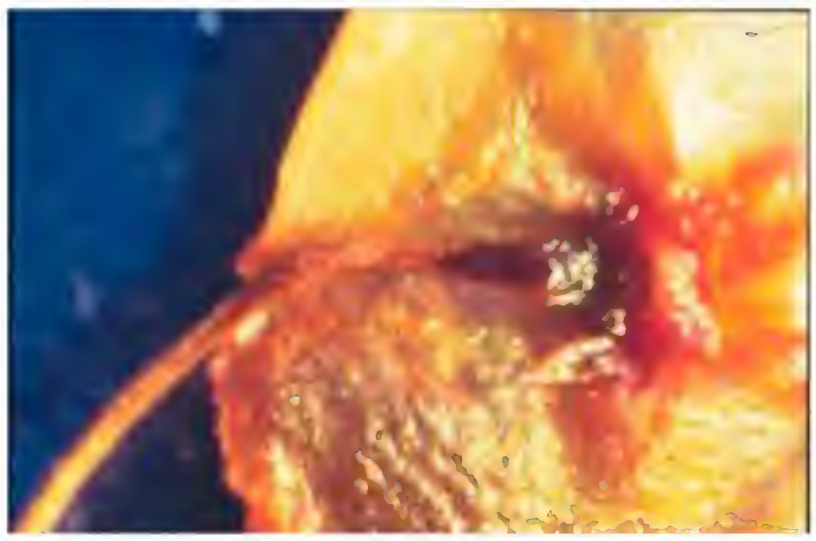
Translator

length	0.18 mm
depth	0.06 mm

Caudicle bulb cup shaped (ascus) 0.16 x 0.06 mm


PLANTS OF POLYNESIA
TA'U. SAMOA
Asclepiadaceae
Hoya sp.
Vine with white flowers, occasional as a climber in trees along the Faleulu stream course at 350 m elevation.
Coll. Art Whistler
No. 7989
Date 9 Jan. 1991
1

Micro photographs follow for the above sheet #7989:



View of the pedicel, calyx and outside of the corolla enlarged about 8X. The calyx is small and does not reach the corolla sinuses. Pedicel is shriveled and a darker color. 2.4 cm long. Outside surface of the calyx is granulose.

Pedicel, calyx and ovaries side view, enlarged about 8X. Pedicel is terete and glabrous. Calyx is small with cilia, inside smooth and shiny thickened centrally, otherwise membranous. Ovaries are dome shaped, 0.14 cm tall and 0.10 cm wide at base pair. Sepals 0.15 cm long 0.15 cm apex to the center 0.20 cm; at the widest near the base, plump ligules present.

Below: Outside view of the corolla at the lobe apex enlarged about 8X. Finely puberulent on this surface, widest just above the sinuses, apex acute, cut more than half way.

Sinus - sinus	0.55 cm
Sinus - center	0.50 cm
Sinus - apex	0.65 cm
Widest	0.65 cm
Apex - center	0.97 cm

Flower flattened is 1.94 cm in diameter, a relatively large flower.

Inside view of the flower enlarged about 8X. Corolla inside is pubescent with stiff white stella hairs, sparse under the corona. Corona inner lobe raised, spatulate, relatively long which reach the center, outer apex obtuse, dorsal concave,

Apex - apex	0.34 cm
Apex - center	0.34 cm
Widest	0.18 cm

Inside view of the corolla with the corona removed enlarged about 8X. The pubescence on this surface diminishes as it approaches the central collar.

Top view of the corona, one lobe missing, there is a lower shelf like lobe starting at the anther wings extend to near the lobes outer apex. Dorsal edges are sharp, outer apex also raised a little.

View of the underside of the corona enlarged about 10X. The scales are channeled nearly to the central column, which is short. The lower side lobes that make up part of the groove sides do not extend to the scale outer apex. Inner edges (here yellow) are thickened and have rounded edges.

Side view enlarged about 16 X to better show any detail. The lobe back is swayed, both ends raised, inner lobe is spatulate covering the triangular creped anthers, scale is relatively thick.

Retinaculum enlarged about 165X. Note the horns at the shoulder extending backward from this region. The translators are close to the retinaculum sides here and the caudicle is stretched out above.

Pollinarium enlarged about 165X. Retinaculum here skewed to one side.

Pollinium		
	length	0.55 mm
	widest	0.21 mm
Retinaculum		
	length	0.15 mm
	shoulders	0.12 mm
	waist	0.08 mm
	hip	0.10 mm
	extensions	0.05 mm
Translator		
	length	0.13 mm
	depth	0.02 mm
Caudicle		
	bulb diam.	0.06 mm

Description of the herbarium sheet 7989:

Hoya sp. 9 Jan. 1991 Vine with white flowers, occasional as a climber in trees along the Faleulu stream course at 350 m. elevation. Ta'u, Samoa. 2 stems both with peduncles and one with a pod, one with a flower cluster 23 pedicels most with flowers. Leaves ovate-elliptic apex tapered acute base rounded, glabrous, opposite, nervation pinnate obscure, anastomosing, midrib slightly extended below sunken a little above 5.5 - 7.5 cm long x 2.4 - 3.6 cm broad in the middle. Petiole glabrous, terete, 1.2 - 1.6 cm long, grooved above. Internodes terete, glabrous same color dried as leaves and petioles, 3.5 - 12 cm long 0.2 cm in diameter. Peduncles 4- 6 cm long, terete, glabrous, mostly straight, 0.1 cm in diameter. Pedicels all same length, terete, glabrous, filiform 1.1 cm long x 0.5 cm in diameter. Rachis tapered finely bracteate, here 2 are 0.8 cm long, glabrous. Pod needle like 5 cm long, glabrous tapering to an acute apex. Calyx small, flower campanulate.

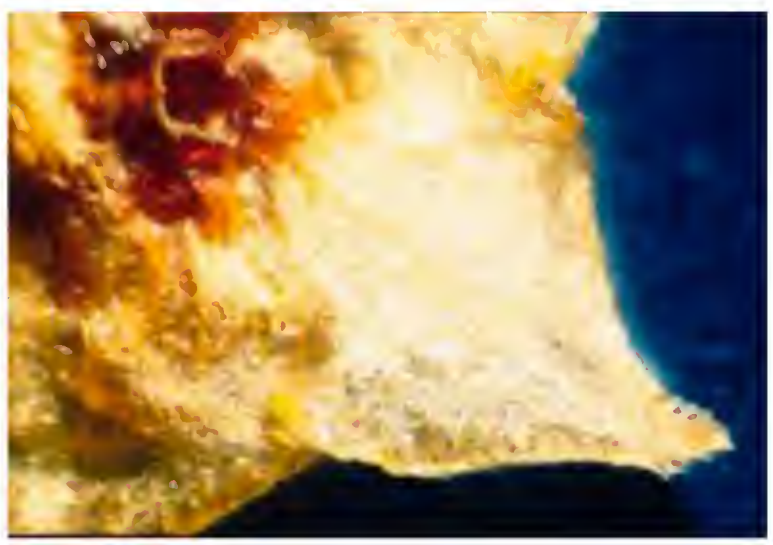
Determined as Hoya whistlerii


FLORA OF SAMOA

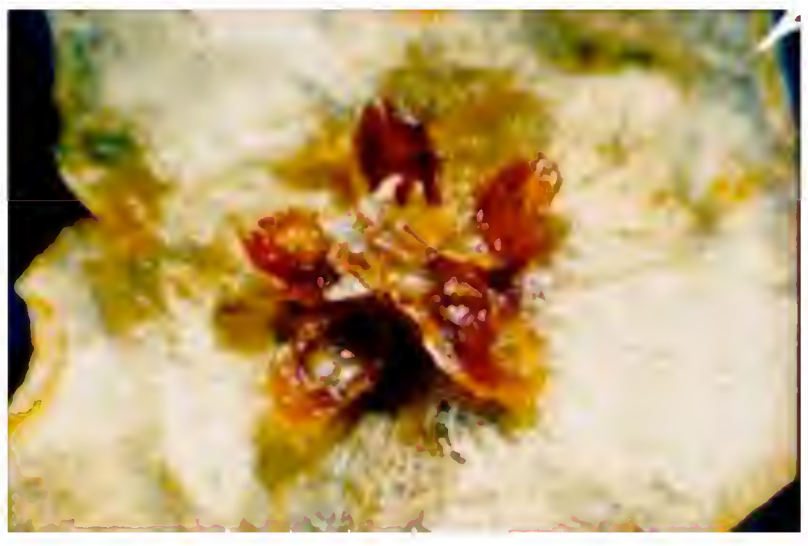
Photomicrographs of sheet above #8798:

Pedicel attached to the corolla enlarged about 8X, terete, glabrous, 2.23 cm long, light yellow-buff, 0.05 cm in diameter, with slight curve.

Pedicel and calyx with ovaries enlarged about 8X. Calyx is small, ciliate, does not even reach half way to the corolla sinuses, centrally thickened, surface glabrous, overlapped at the base with possibly one large ligule inside. Ovaries short domed 0.12 mm tall and base pair 0.11 cm wide, glabrous.



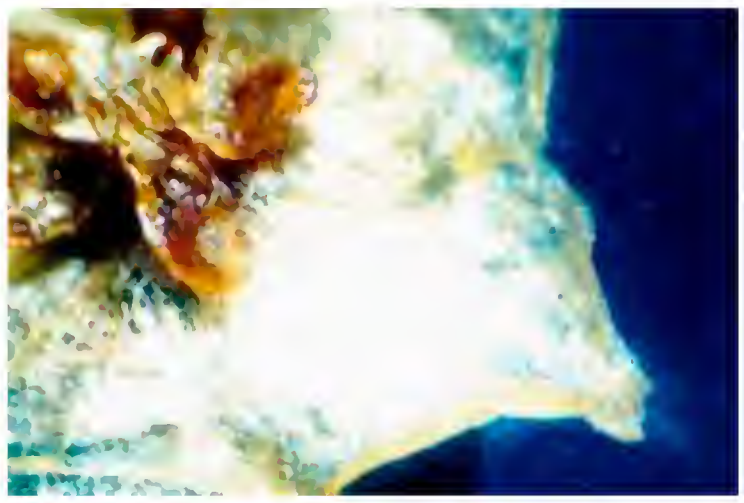
Corolla outside surface enlarged about 8X. Corolla broad not deeply cut glabrous on this surface, lobes triangular broadest just above the sinuses with small conduplicate lobes curved under, apex acute. Central collar darker color, raised 0.06 cm opening 0.05 cm x 0.08 cm, inside, walls thickened, glabrous.



Flower inside view enlarged about 8X. Corolla surface is puberulous, glabrous under the coronal area.

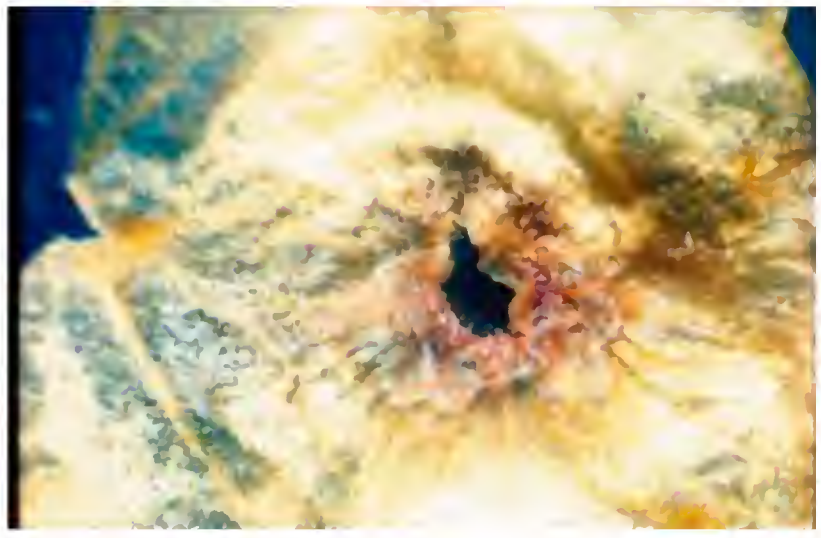
Sinus - sinus	0.55 cm
Sinus - center	0.43 cm
Sinus - apex	0.60 cm
Apex - center	0.85 cm
Widest	0.62 cm

Flower flattened is 1.70 cm in diameter.



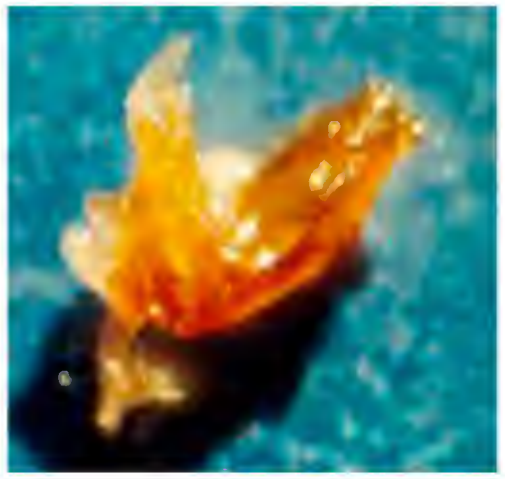
Flower inside at the corolla lobe apex enlarged about 8X. Center of corona is upright, glabrous, inner lobes are spatulate, long and narrow, outer apex rounded, dorsal somewhat concave and apparently keeled along the center, anthers extend equal the inner lobe but exposed.

Apex - apex	0.30 cm
Apex - center	0.32 cm
Widest	0.13 cm
Ret. - ret.	0.09 cm



Corolla inside view enlarged about 8X. There are stellate hairs inward below the coronal center. Center darker color, slightly raised and thickened.

Lower view of the corona enlarged about 8X. Lobe centers are channeled all the way to the central column, which is thick, fluted, 0.05 cm tall.



Top-side view of a coronal scale enlarged at least 16X. Note the long inner lobe and the extended anther, dorsal sway backed and slightly concave with wide central ridge edges sharp, outer lobe rounded, anther wings not deeply curved. Portion of column to left below.

Pollinarium enlarged about 165X. (one pollinia missing).

Pollinium

length	0.56 mm
widest	0.26 mm

Retinaculum

length	0.27 mm
shoulder	0.16 mm
waist	0.05 mm
hip	0.10 mm
extensions	0.03 mm

Translator

length	0.18 mm
depth	0.04 mm

Caudicle bulb (very large, clear)

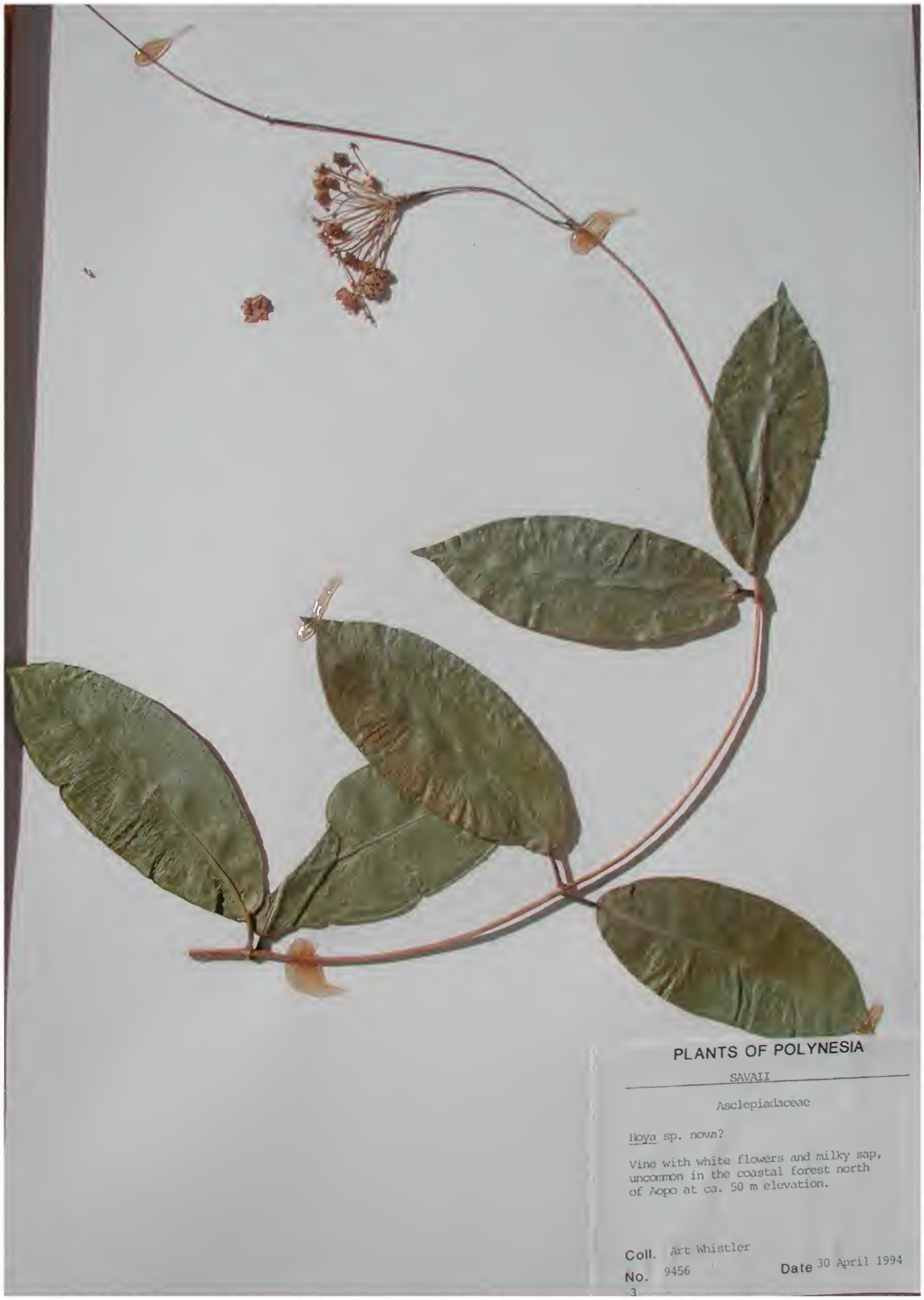
diameter	0.18 mm

The clear caudicle can be seen as a light area on the left upper side of the retinaculum and covering the lower portion of the pollinium, it is also squared off slightly on the left at the end of the translator.

Description of the herbarium sheet Above:

8798 Vine with white flowers and milky sap, occasionally in the forest east of the microwave tower on Mt. Tumu, 450 m Ofu, Samoa. 1 stem 3 leaves at 4 nodes, 1 peduncle 5 flowers, 5 Flowers in the envelope. Leaves small broadly ovate attenuate, base rounded, midrib fine protruding on bottom, pinnate obscure nervation, 4.5 - 6.5 cm long x 2.5 - 2.6 cm at widest. Petioles thin 1.5 cm, long, do not appear to be grooved above. Internodes 9-12 cm long, terete, glabrous, nodes enlarged. Peduncles straight, glabrous, 3.6 cm long. Pedicels straight, glabrous, 2.3 cm long, filiform. Calyx small, does not reach the corolla sinuses.

Determined as Hoya whistlerii



PLANTS OF POLYNESIA

SAVAII

Asclepiadaceae

Hoya sp. nova?

Vine with white flowers and milky sap, uncommon in the coastal forest north of Aopo at ca. 50 m elevation.

Coll. Art Whistler

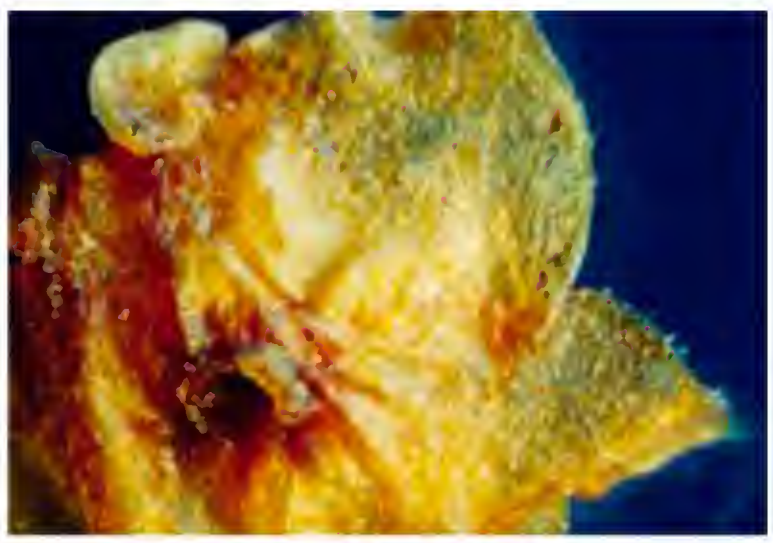
No. 9456 Date 30 April 1994

3

Photomicrographs of sheet above #9456:

View of the outside of the flower enlarged about 8X. The calyx lobes are very small and does not reach the corolla sinus. The pedicel is glabrous, terete, 2.4 cm long 0.07 cm in diameter.

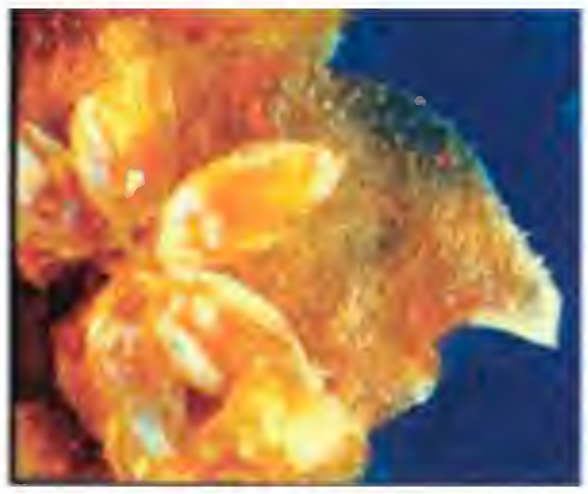
Outside and inside view of the pedicel and calyx including the ovaries enlarged about 8X. The calyx is glabrous, apex to base 0.17 cm long and 0.15 cm at the widest. Sepal apex is narrowly rounded, no ligules were observed. Ovaries narrowly domed, 0.17 cm tall, glabrous.



Corolla outside enlarged about 8X. Outside surface is granulose, glabrous, lobes are not deeply cut apex is acute, sinus area is very wide (conduplicate). The central collar is thickened and dark colored mouth is 0.10 cm x 0.16 cm and 0.06 cm tall.

Outside of the corolla at the apex area enlarged about 8X. note the wide edges of the corolla just above the sinus area which turn under (left side) and show a reddish tone here.

Sinus - sinus	0.52 cm
Sinus - center	0.37 cm
Sinus - apex	0.65 cm
Apex - center	0.85 cm
Widest	0.55 cm



Inside view of the flower enlarged about 8X. Surface of the corolla is pubescent, lobes very wide above the sinus. Coronal lobes do not reach the corolla sinuses, inner lobes knife like clear to the center but anthers rise over the inner lobes. Dorsal is concave with a umbo near the inner apex and surface is longitudinally sulcate, edges sharp, outer lobe is tapered sub acute. Stiff hair cells under corona point centrally.

Top view of the corona scales not regular, due to pressing on herbarium sheet, enlarged about 8X. As above center raised a little.

Apex - apex	0.33 cm
Apex - center	0.35 cm
Widest	0.15 cm

Bottom view of the corona enlarged about 8X. lobes are channeled to inward a little form the sinuses, sides diagonally sulcate. Central column, thin walled, 0.16 cm tall.

Side view of a coronal scale enlarged about 16X. Inner lobe rises overtopped by the anther, back is slightly swayed. Anther wings a little scythe shaped and edges thickened.

View of the stylar crown after inner coronal lobes and anthers are pulled back. Center raised from the pentagonal table, not rigidly structured a little mealy.

Pollinia

length	0.54 mm
widest	0.21 mm

Retinaculum

length	0.18 mm
shoulders	0.12 mm
waist	0.06 mm
hip	0.10 mm
extensions	0.03 mm

A better view of the retinaculum enlarged as above. Translators are short and wider near the retinaculum only part of the clear caudicle on top is visible here, may have stayed on the pollinium end. Same retinaculum will yield some structural differences due to depth of focus as this is a 3 dimensional object. Note here the shoulders seem to turn up and as they go back at a lower level, they turn down. Pollinia has a clear pellucid edge from top to near the inner end and accompanied by the void area with no pollen structures present. Some pollen grains have germinated.

Description of this herbarium sheet follows:

9456 Vine with white flowers and milky sap, uncommon in the coastal forests north of Aopo, Savai'i, Western Samoa, at ca. 50 m elevation. 1 stem 3 pr. leaves and 1 flower cluster, 23 flowers. Leaves oblong, broadly elliptic, glabrous, shortly apiculate, base obtuse, pinnate nervation, reticulate anastomosing, midrib exposed below, 10-10.5 cm x 3.5 - 4 cm Petiole long ca. 1 cm, grooved on upper, side 2 basal glands (round, light buff). Internodes 9 - 13 cm, terete, glabrous, 0.1 - 0.2 cm in diameter. Peduncle terete, glabrous, filiform 5 cm long 0.08 cm in diameter. Rachis filiform, glabrous, terete ca. 2.5 cm long. Calyx small does not reach corolla sinuses; sepals 0.2 cm at the most long. Corona center raised seems to reach sinus of corolla not deeply cut.

NO known species

Calyx comparisons

	Sepals length x width	to Corolla sinuses		Ligules
W 2705				
W 3801				
7605				
7989	0.15 cm x 0.10 cm	1/4 way		plump 5
8798	ciliate	-1/2 way		1 large?
9456	0.17 cm x 0.15 cm	-1/2 way	none	

Corolla Comparisons

	Sinus - Center	Sinus - sinus	Sinus - apex	Widest	Apex - center
W 2705	0.40	0.24	0.55	0.50	0.80
W 3801	0.43	0.42	0.52	0.52	0.82
7605	0.53	0.67	0.65	0.70	0.82
7989	0.50	0.55	0.65	0.68	0.97
8798	0.43	0.55	0.60	0.62	0.85
9456	0.37	0.52	0.65	0.55	0.85

Corona comparisons

	Apex - apex	Apex - center	Widest	Aw. - aw.	Ret. - ret.
W 2705	0.35	0.35	0.16		
7605	0.30	0.35			
7989	0.34	0.34	0.18		
8798	0.30	0.32	0.13		0.09
9456	0.33	0.35	0.15		

Vegetative comparisons:

	leaves	peduncle	pedicel	Flower #/color	Elevation
W 2705	4.5 - 5.5 x 2.5 - 3	2.7	2 - 2.5	8/white	350m
W 3801	5.5 x 2.5 - 3	4	2	11/white	200m
7605	5.5 - 6 x 2.5 - 3	4.5	2.7	7/white	350m
7989	5.5 - 7.5 x 2.4-3.0	4-6	2.2	23/white	350m
8798	4.5 - 6.5 x 2.5 - 2.7	3.6	2.3	11/white	450m
9456	10-10.5 x 3.5 - 4	5	2.5	23/white	50m

Pollinarium comparisons in mm

	W 2705	W 3801	7605	7989	8798	9456
Pollinium						
length	0.47	0.44	0.47	0.55	0.56	0.54
widest	0.21	0.18	0.20	0.21	0.26	0.21
Retinaculum						
length	0.15	0.17	0.17	0.15	0.27	0.18
shoulder	0.11	0.11	0.14	0.12	0.16	0.12
waist	0.10	0.05	0.06	0.08	0.05	0.06
hip	0.11	0.08	0.09	0.10	0.10	0.10
extensions	0.04	0.05	0.04	0.05	0.03	0.03
Translator						
length	0.11	0.13	0.18	0.13	0.18	
depth	0.05	0.03	0.06	0.03	0.04	
Caudicle						
bulb diam.			0.06	0.06	0.18	

Samoan Hoya's Third Folder

List of sheets: (10)		listed	Determined
W 1106	*	filiformis	attenuata ?
W 1617	*	filiformis	attenuata possibly as corolla glabrous.
W 1983	*	attenuata/betchei	possibly betchei but fl. small and other diff.
W 2643	*	filiformis/betchei	could be filiformis but puberulous inside seems to me it is H. whistlerii.
W 3252	*	betchei	Not that species, flowers too small, peduncle and pedicels too short. Does not fit any sp. Pollinium very short
W 3961	*	filiformis/betchei	Not filiformis flowers to large 1.4 vs. less then 0.9 cm diam. Altitude not low. Not betchei, flowers too small, retinaculum too large, peduncles and pedicels too short, inner coronal lobes spatulate not dentate, leaves too short, corolla cut more then half way. Like W 2643.
5714	*	filiformis/betchei	New Species
9539	*	cf. diptera	Not diptera coronal lobes do not reach sinuses, maybe H. whistlerii but differences
10007	*	diptera	twice as many flowers as diptera, pedicels too long 2.5 vs. 0.8-2.0 cm long, calyx larger 0.18 vs. 0.07-0.11 cm long.
10339	*	diptera	This and 10007 have spatulate inner coronal lobes whereas H. diptera's are dentate and lobes here concave on top not convex.

*** Sheets with flowers micro photographed and measured.**

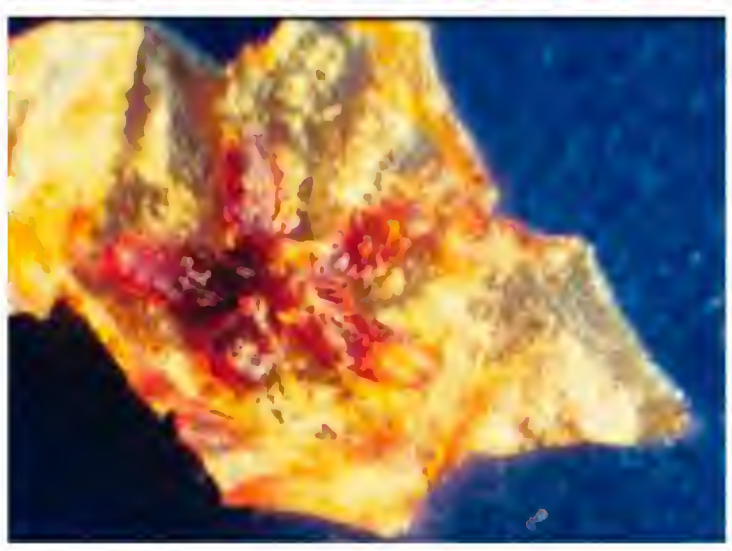
Data and photos of flower parts of each sheet follows, for those sheets with loose flowers. Sheets have been reduced to scan and place in this file. Sheets are 11.5 " x 16.5 " in the natural state.


PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hoya
Vine with milky sap, flowers white, growing
in the forest from a tree on the top of a
a crater SE of Mt. Mariota; elevation 600 m.
Coll. Art Whistler
No. W 1100
Date 15 Nov.1973
Flora of Samoa
Hoya filiformis Rech.
Art Whistler
Date Feb.1975

Data and Photos of flower parts of the above herbarium sheet copy:

No pedicel nor calyx available in loose flower packet.

Corolla outside surface enlarged about 8X. The surface is granulose and glabrous, the lobes are wide just above the sinus leading to a small flap which turns under (conduplicate). The structure is thick, cut more than half way. Apex is acute. Center thickened but very short (collar).



Flower inside view enlarged about 8X. This surface of the corolla is puberulent. Corona is small, scale apexes do not reach the sinuses.

Sinus - sinus	0.30 cm
Sinus - center	0.20 cm
sinus - apex	0.42 cm
Apex - center	0.60 cm
Widest	0.40 cm

Flower diameter flattened would be 1.20 cm

Top view of the corona enlarged about 16X. alignment off due to pressing, it appears the anther wings are very prominent. Inner lobe long and dentate rising in the center, lobes narrow, outer apex obtuse, emarginate, not visually sulcate.

Apex - apex	0.20 cm
Apex - center	0.20 cm
Widest	0.08 cm

Bottom view of the coronal scale enlarged about 16X. Lobes are channeled with lateral sulcations on the sides. All surfaces are glabrous. Anther wings protrude and are visible below.

Side view of a coronal scale enlarged about 16X, not well focused. Outer lobe rounded, dorsal sway backed and inner lobe long and rising, anther wings overtopped but not covered by inner apex. Anther wings are moderately scythe shaped and thickened.

Pollinium enlarged about 165X. Pollinia and Retianculum could not be removed attached. Lower right edge folded in slightly.

Pollinium		
	length	0.52 mm
	widest	0.21 mm
Retinaculum		
	length	0.18 mm
	shoulder	0.09 mm
	waist	0.05 mm
	hip	0.08 mm
	extensions	0.03 mm
Translator		
	length	0.10 mm
	depth	0.04 mm
Caudicle bulb		
	diameter	ca. 0.05 mm

Retinaculum laying a little sideways enlarged about 165 X. translator close to side on left and skewed down on right side, caudicle enveloping apical end.

Description from Herbarium sheet:

W 1106 as *Hoya filiformis* Reich. 14 Nov. 1973. Vine with milky sap, flowers white, growing in the forest from a tree on the top of a crater SE of Mt. Mariota; elevation 600 m. Upolu, Samoa. 2 intertwined stems + one branch, leaves here larger and darker (dried), stems not as filiform, 12 leaves total, 1 flower cluster: envelope with one flower. Leaves elliptic, very long attenuate 4.5 - 7.5 cm long x 2 - 2.5 cm wide, glabrous, pinnate netted anastomosing nervation 3-4 pairs at 45° to the midrib which is faintly visible above more so below. Petiole glabrous, grooved above, narrow 0.7 - 0.8 cm long from slightly enlarged nodes in opposite pairs. Internodes 1.5 - 10.5 cm, long, terete, glabrous to 0.2 cm in diameter. Peduncle filiform, terete, glabrous, 3.2 cm long w/rachis bracteate, round 0.7 cm long, lighter color. Pedicels filiform, terete, glabrous, dark color, 2 -2.2 cm long. Flowers campanulate, w/long small calyx, dark color. Corolla outside glabrous.

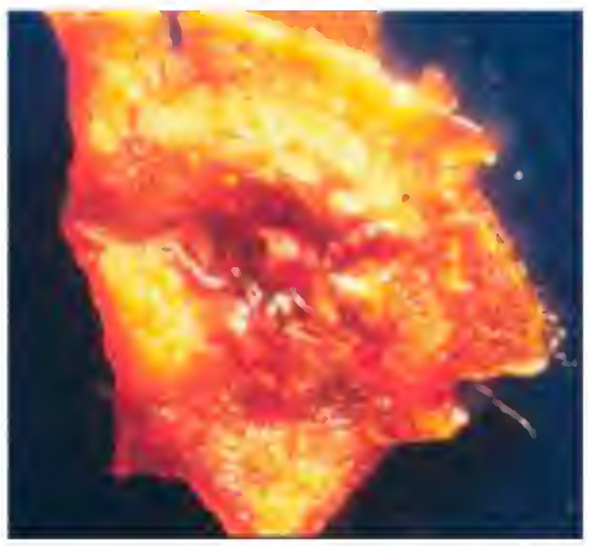

Herbarium of the University of Hawaii, Honolulu
Flora of Samoa
Hoya filiformis Rech.
Art Whistler
Date: Feb.1975
PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hoya
Vine with white flowers, climbing in trees in the forest on the east rim of Lake Lanoto'o elevation 700 m.
Coll. Art Whistler
No. W 1617
Date 17 Feb.1974
5

Photo as slide taken by Dr. Art Whistler

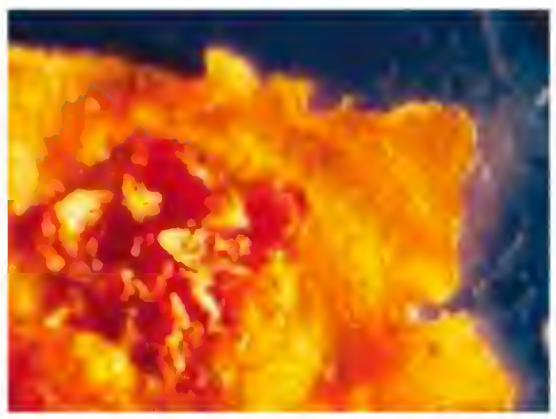
Photomicrographs of the flowers of above sheet:

Pedicel, calyx and outside portion of the corolla enlarged about 8X. Pedicel here 1.5 cm long, terete, glabrous. The calyx is small, ciliate.

Calyx and pedicel with ovaries exposed enlarged about 8X. Sepals are glabrous, rough outside shiny inside, are broad based ovate-triangular, ciliate with dark ligules; 0.13 cm long x 0.10 cm at the widest, overlapped at the base. Ovaries are narrowly dome shaped 0.13 cm tall and the base pair 0.06 cm wide.



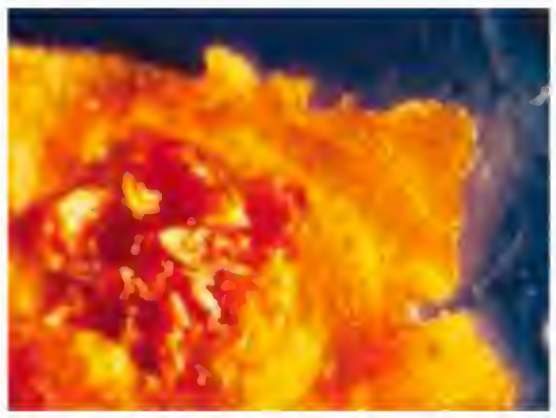
Corolla outside view enlarged about 8X. This surface is granulose, glabrous, lobes are cut a little less than half way and are very broad just above the sinuses where they fold under to form conduplicate edges. The center collar is thickened and protruding.



Flower inside enlarged about 8X. Inside surface of the corolla is puberulent. Coronal lobes do not reach the corolla sinuses.

Sinus - sinus	0.20 cm
Sinus - center	0.38 cm
Sinus - apex	0.40 cm
Apex - center	0.60 cm

Flower flattened is 1.20 cm in diameter.

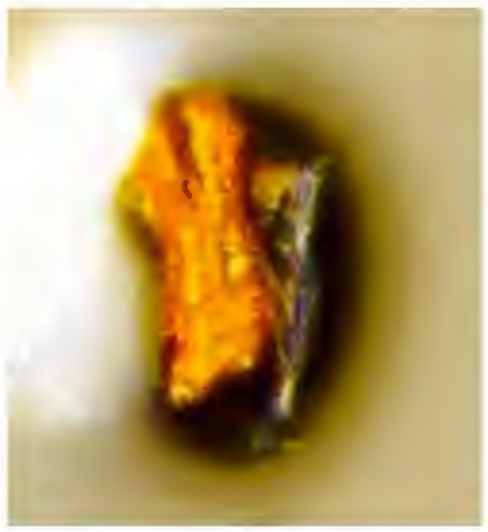


Top view of the corona enlarged about 8X. Outer coronal lobe is obtuse, inner lobe is tapered spatulate and very thin, dorsal is concave with sharp edges, corona was difficult to separate from the corolla. Inner lobe reaches the center but does not cover the anthers.

Apex - apex	0.20 cm
Apex - center	0.22 cm

Coronal bottom view enlarged a little over 8X. Glabrous on all surfaces, the lobes are channeled and the edges are diagonally sulcate, lower side lobes reach the apex making it emarginate.

Not very clear pictures of the side view and top view of a coronal scale enlarged about 16X. Details described above. The scaled are rather short and dumpy, anther wings are not prominent.



Retinaculum enlarged about 165 X. This structure is very narrow and somewhat deep. It was extremely difficult to get to lay so the top could be photographed.

A much enlarged view of the retinaculum on its side This was photographed with a 400X lens so I do not have the exact measurements although the eyepiece reticle has the arrow at 0.1 mm long

Pollinarium enlarged about 165X. Here the retinacula refused to lay flat and is turned again on its side since the width at the tip is very narrow, more narrow than any I have worked with previously.

Pollinium

length	0.49 mm
widest	0.18 mm

Retinaculum

length	0.17 mm
shoulders	0.14 mm
waist	0.05 mm
hip	0.05 mm
extensions	0.02 mm

Translator

length	0.08 mm
depth	0.03 mm

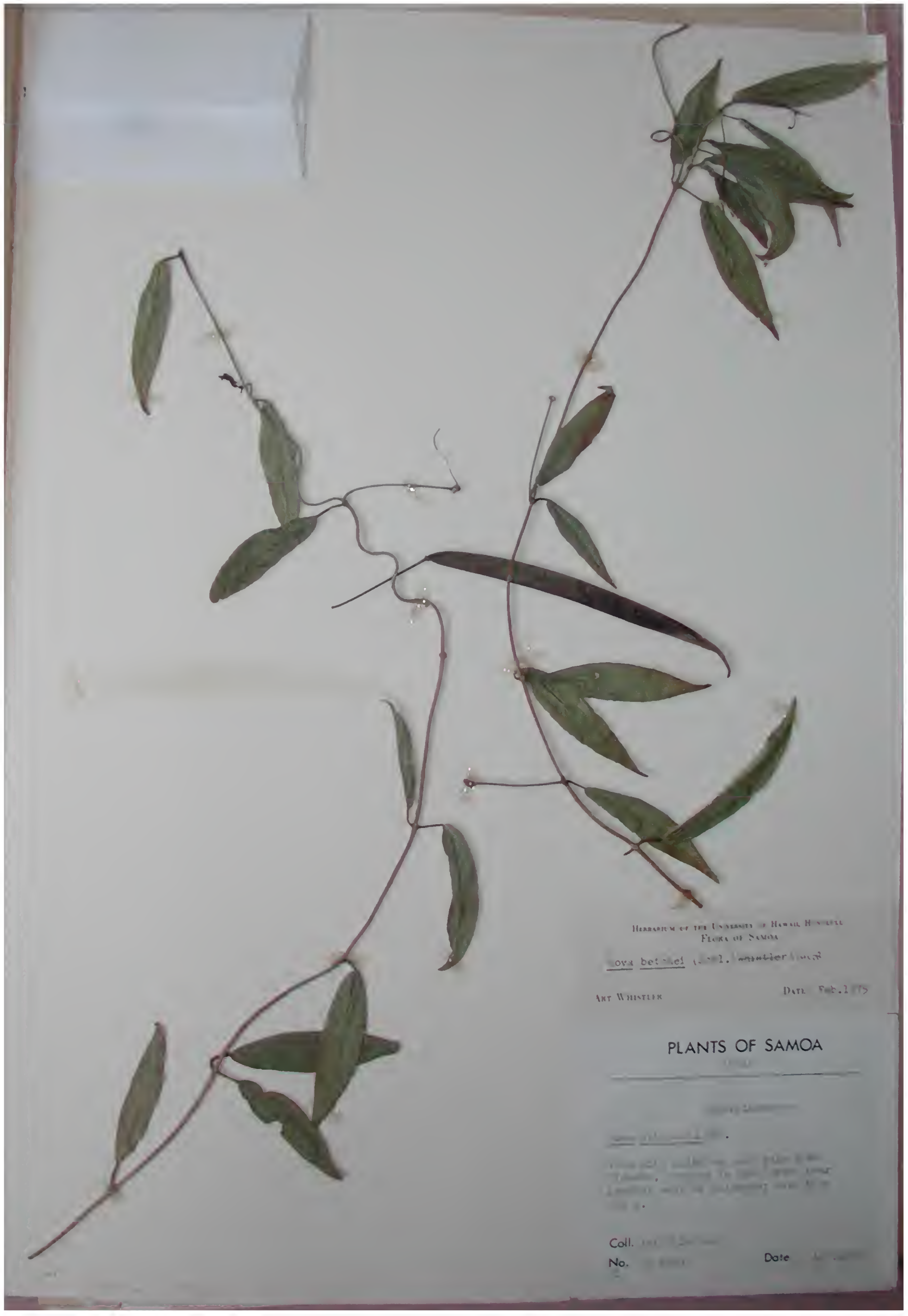
Caudicle bulb

diameter	0.07 mm

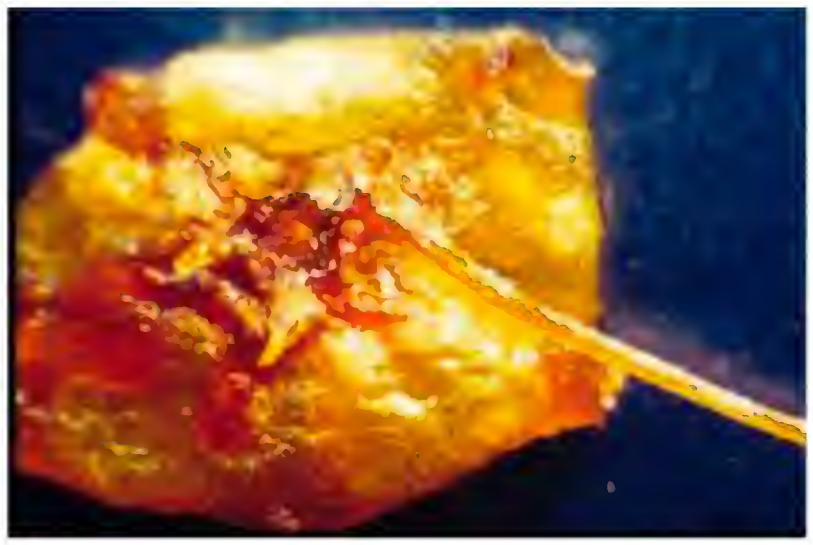
Description of the herbarium sheet follows: (1617)

W 1617 *Hoya filiformis* Reich, 17 Feb, 1974 Upolu, Samoa. Vine with white flowers, climbing in trees in the forest on the east rim of Lake Lanato'o, elevation 700 m. 3 fine stems 14 leaves in all 4 peduncles 1 with 1 pedicel; 1 with 7 flowers. Envelope with pedicel and 5 flowers. Leaves elliptic long attenuate 4 - 5.5 cm long, thin, glabrous, 1.5 - 2 cm at widest near the middle, obscure pinnate netted nervation, midrib slightly visible below. Petioles 0.5 -1 cm long, filiform, glabrous, grooved above, do not observe a basal gland. Internodes 6 - 7 cm long, terete, glabrous,, stems filiform, nodes slightly enlarged. Peduncles 1 - 1.6 cm long, filiform, glabrous, terete, rachis finely bracteate, round, longest here 0.5 cm x 0.2 cm in diameter. Pedicels filiform 1.5 - 1.7 cm long. Calyx small 1/2 way to the corolla sinuses. Corolla campanulate; outside glabrous.

Note: not filiformis, flowers not flat, flowers not glabrous inside, elevation too high, flowers too large 1.2 cm vs. less than 0.9 cm, peduncle too long 1.6 cm vs. 0.8 cm Closer to H. attenuata.

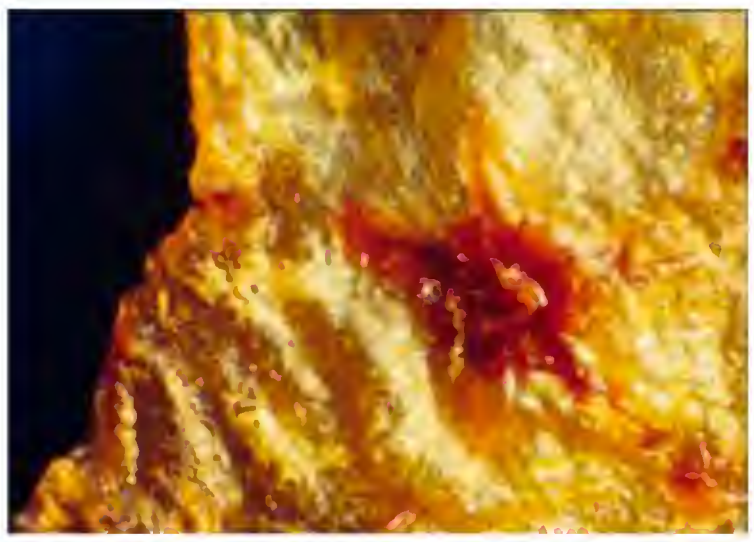

Herbarium of the University of Hawaii, Honolulu
Flora of Samoa
Art Whistler
Date Feb. 1975
PLANTS OF SAMOA
Coll.
No.
Date

Micro photographs and measurements of the above sheet # W 1983:



Outside view of the flower enlarged about 8X. The pedicel is very fine, 2.3 cm long, terete, glabrous 0.04 cm in diameter. Calyx is small and the sepal apexes do not reach the corolla sinuses. Corolla outer surface is glabrous.

Calyx (and pedicel) side inside view enlarged about 8X. Sepals are ciliate, surfaces are glabrous. 0.10 cm long 0.02 cm to the center from the outer apex. There are small dark ligules present at the bases. Apex is fairly acute to slightly rounded. Ovaries are domed 0.10 cm tall and the base pair 0.08 cm wide.



Outside view of the corolla at the sinus area enlarged about 8X. Central collar is dark colored, protruding 0.02 cm, a little thickened opening 0.09 x 0.08 cm

Sinus - sinus	0.38 cm
Sinus - center	0.32 cm
Sinus - apex	0.68 cm
Apex - center	0.85 cm
Widest	0.50 cm

Flower flattened is 1.70 cm in diameter.

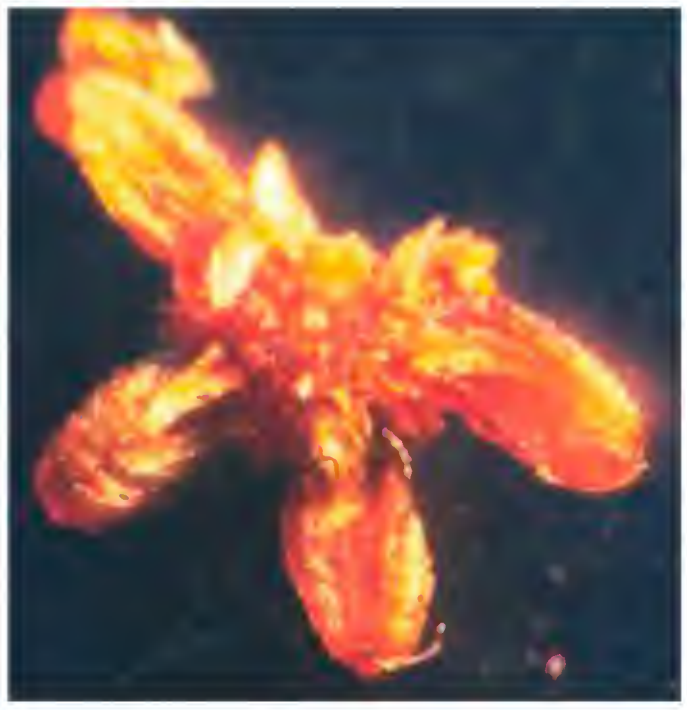
Flower inside view enlarged about 8X.
Corona is small, inner lobe is spatulate raised and reaches the center, lobes narrow, outer apex rounded, a long way from the corolla sinuses. Anther wings are doubled and protruding.

Top view of the corona showing the very prominent anther wings. Note the narrow scales.

Apex - apex	0.33 cm
Apex - center	0.33 cm
Widest	0.10 cm
Anther win - aw.	0.14 cm
Retinaculum - ret.	0.07 cm

Corona bottom view enlarged about 8X. Scales are channeled, to the central column, and narrow, anther wigs protruding here are doubled and thick walled.

Side view of a coronal scale enlarged about 16X. Inner lobe is raised dorsal relatively horizontal apex obtuse. Anther wings are thick and scythe shaped. The scale is not very deep.



Top view of the corona with the central stylar area exposed, enlarged about 16X. The edges of the pentagonal table here are rounded and striate on the upper surface, this hides the retinaculum and the pollinia were also difficult to extract because of this structure. The raised center here shows up as a yellow spot. I believe the retinacula are actually formed under the stylar table and the way the anther wings protrude under this structure would indicate this.

Retinaculum enlarged about 165X.

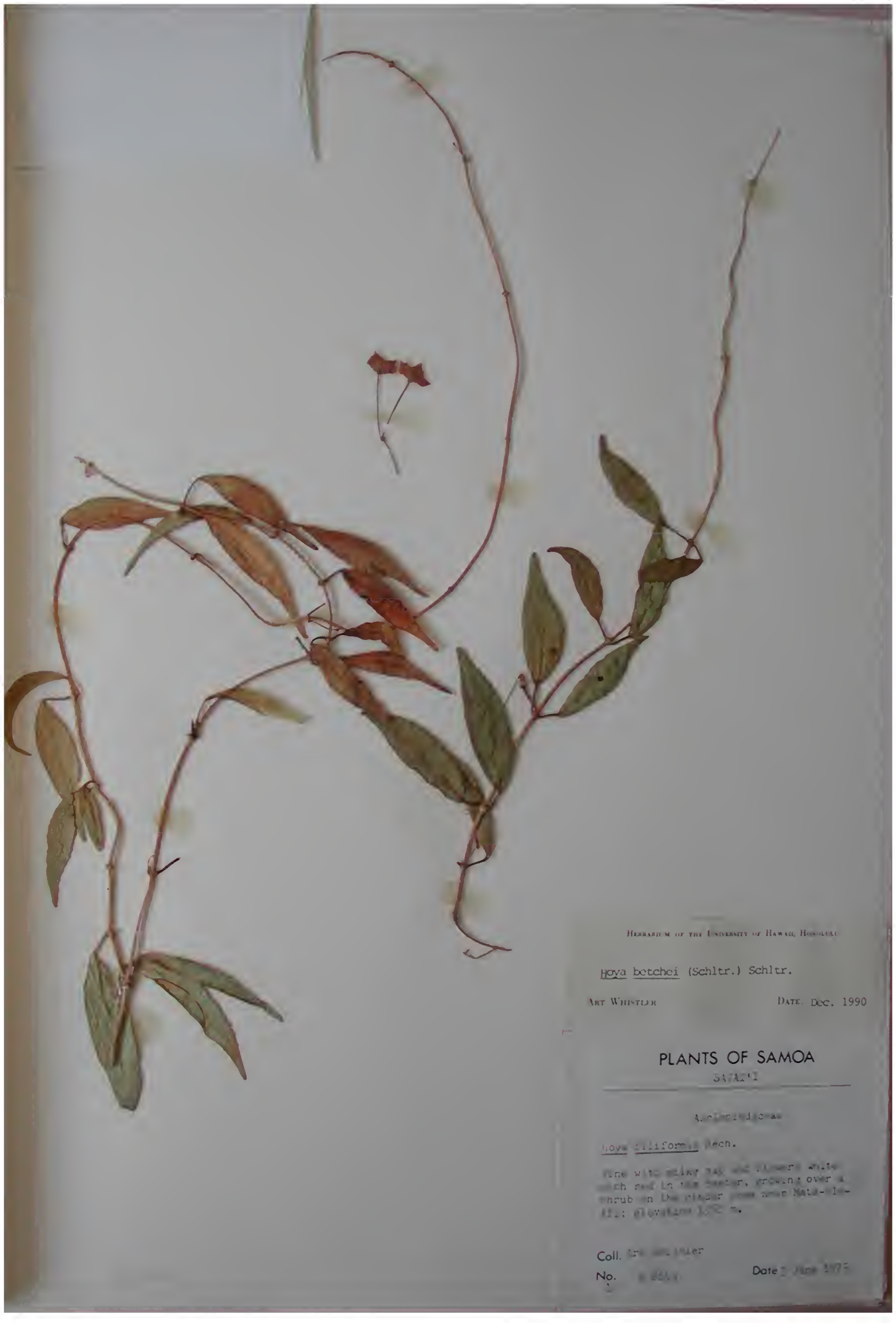
length	0.21 mm
shoulder	0.17 mm
waist	0.09 mm
hip	0.12 mm
extensions	0.05 mm

Above is a single pollinium enlarged about 165X. It is slightly distorted possibly along the lower left edge and the pellucid edge is folder over at the lower right side. Length is 0.75 mm and the widest here is 0.25 mm it might actually be slightly wider than that.

Description of the above herbarium sheet W 1963.

W 1983 *Hoya attenuata* Chris. (det, *as H. beitchei* Feb, 1975) 15 April 1974, Upolu, Samoa. Vine with milky sap and pale green flowers, growing in the forest near Lanatai west of Lalomanu; elevation 250 m. 2 stems 1 with 9 leaves & peduncle + 1 pedicel; 1 with 13 leaves, 3 peduncles 1 with 2 pedicels no flowers. Envelope with 12 flowers. Leaves narrowly elliptic attenuate, nervation obscure above occasionally visible on lower surface, pinnate netted, anastomosing, glabrous 4.5 - 5.5 cm long, 1 -1.3 cm widest near the middle, base narrowly rounded nearly cuneate, midrib visible below. Petiole 0.6 -0.8 cm long, terete, fine, grooved above, fine basal gland, glabrous. Internodes 3 - 5 cm long, stem not filiform, 0.1 + cm light brown, nodes just a little enlarged, terete, glabrous. Peduncle straight, terete, glabrous 2.7 - 3.5 cm long, rachis finely bracteate. Pedicels filiform 2.5 cm long (extremely fine). Calyx extremely small. Pod dark, glabrous, from an enlarged peduncle and calyx 10.5 cm long, narrow.

Note: not betchei, flowers too small 1.7 cm vs. 2.4 cm, elevation not high, pedicels and peduncle too short, sepals ciliate, coronal inner lobe spatulate. It is difficult to say if this sp. is campanulate but if so possibly labeled correctly as H. betchei in spite of many differences from Type.


Herbarium of the University of Hawaii, Honolulu
Hoya botchei (Schltr.) Schltr.
Art Whistler
Date. Dec. 1990
PLANTS OF SAMOA
SAVAI'I
Asclepiadaceae
Hoya filiformis Rech.
Coll. Art Whistler
No.
Date 7 June 1975

Picture from slide taken by Dr. Art Whistler

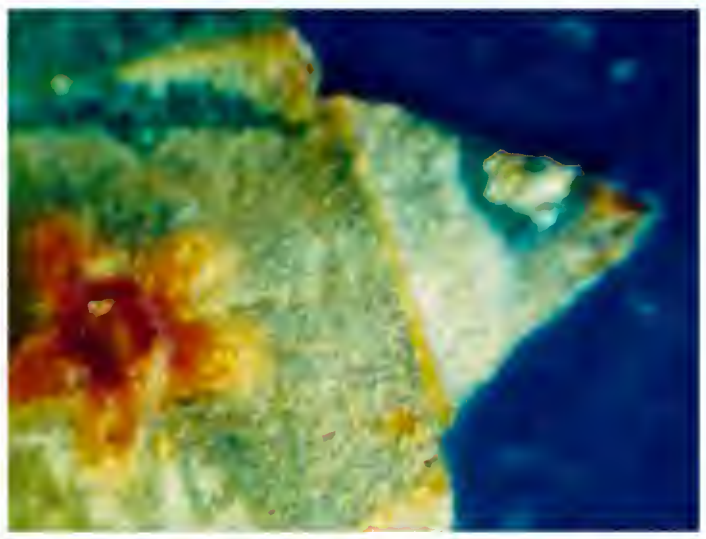
Micro Photos of above sheet W 2643 and data:

Pedicel with calyx and ovaries showing enlarged about 8X. Here 1.8 cm long, scattered short hairs present, 0.04 cm in diameter, glabrous, terete, lenticular.

Calyx granulose outside, ciliate, broadly triangular apex rounded with the center thickened. 0.11 cm long and 0.13 cm at the widest. Base is enlarged (cup shaped).

Ovaries narrowly domed, 0.10 cm tall and the base pair 0.10 cm wide, glabrous on all surfaces.

Corolla outside enlarged about 8X. This surface is finely granulose and glabrous. Darker corona showing through the surface, pentagonal lines are due to the folding of the corolla lobes in pressing. Central collar protrudes a little is 0.08 x 0.10 cm in diameter and 0.02 cm tall.



Outside of corolla at the lobe area enlarged about 8X. Apex is acute.

Sinus - sinus	0.45 cm
Sinus - center	0.40 cm
Sinus - apex	0.52 cm
Apex - center	0.80 cm
Widest	0.51 cm

Flower flattened is 1.60 cm in diameter.

Inside view of the flower enlarged about 8X. Corolla inside is puberulous. Inner apexes are spatulate and touch in the center. Dorsal is concave, outer apex obtuse. Surfaces are glabrous.

Inside view of the corona enlarged about 16X. The anthers are fluted and crepe-like, shown in the center as yellow with the spatulate anther apex on the scale to the right, other scale ends removed.

Apex - apex and center	0.18 cm
Anther wing - aw.	0.12 cm
Aw. - center	0.10 cm
Retinaculum - ret.	0.05 cm
Ret. - center	0.05 cm

Bottom view of the corona enlarged about 16X. the lobes are channeled all the way to the column that is extras large in the center not very tall. Side lobes that form the central part of the groove begin at
the anther wings and converge before reaching the outer lobe apex.

Pollinarium and second retinaculum enlarged about 165X. The inner edges of the pollinia are a little shriveled. The translators are long cupped on top, the caudicle is small: both enter the retinaculum at the waist area. the extensions are long.

Pollinia

length	0.37 mm
widest	0.18 mm

Retinaculum

length	0.15 mm
shoulders	0.12 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.05 mm

Caudicle bulb

diameter	0.04 mm

Description of the above herbarium sheet:

W 2643 3 June 1957. As shown *Hoya filiformis* Reich, relabeled *H. beitchei* Schltr. Ded. 1990. Vine with milky sap and flowers white with red in the center, growing over a shrub on the cinder cone near Mata-ole-afi, Savai'i, Samoa, elevation 1500 m. Two stems filiform with 26 leaves, 2 umbels one with 2 flowers. Envelope with 3 flowers one pedicel. Leaves elliptic short attenuate, apex rounded, base narrowly rounded somewhat cuneate, mostly 4 - 4.5 cm long x 1 - 1.2 cm widest near the middle, glabrous, veins obscure but pinnate anastomosing, midrib dark on the bottom. Petioles 0.5 - 0.8 cm long do not appear to be grooved above, from only slightly enlarged nodes darker then stems, glabrous. Internodes 1.8 - 5 cm long, glabrous, terete, fine ca. 0.01 cm in diameter. Peduncle 0.8 - 1 cm long, terete, filiform, rachis 2 x diameter, lighter color, finely bracteate, round here 0.4 cm long. Pedicels very fine, terete, glabrous 2 cm long. Corolla cut 1/2 way. Sepals very small, dark color, linear and outside glabrous.

Note: Ok as H. filiformis except peduncle too long 2 vs. 0.08 cm and altitude too high and this is not a glabrous species. Not H. betchei as flowers are too small 1.6 vs. 2.4 cm, retinacula too large with only a 2:1 ratio to pollinia, peduncle too short 1 cm vs. 5-6 cm and pedicels too short 2 vs. 3.5 cm I'd say H. whistlerii.

Description of the following Herbarium sheet:

W 3252 *Hoya beitchei* (Schltr.) Schltr. 2 Jan 1976 Upolu, Samoa. Vine with white flowers and milky juice, growing over vegetation on the ridge to the south of Mt. Foa; elevation 400 m. 1 long stem ca. 16 pairs of leaves 4 peduncles 1 with 3 flowers + 4 pedicels. Envelope with 10 flowers. Leaves elliptic attenuate, glabrous, 3 - 5 cm long x 1 - 2 cm widest near the middle, thin textured, nerves obscure but pinnate, netted seen most easily on the bottom; midrib narrow on bottom. Petiole 0.5 - 0.7 cm long, same color as the stem, thin, glabrous, grooved above. Internodes short 3 - 3.5 cm long, stem thin, glabrous, 0.1 cm in diameter. Peduncles 1.2 - 1.5 cm long, terete, filiform a little darker than stem. Pedicel as peduncles, terete, filiform, glabrous, 2.5 cm long. Calyx small, dark color, does not reach the sinuses. Corolla campanulate cut about 1/2 way, glabrous outside, puberulous inside.

Note: Not betchei as flowers are too small 1.6 vs. 2.4 cm peduncles and pedicels also too short. altitude is too low, and inner coronal lobes spatulate not beaked (dentate).


PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hoya b c tchei (Schl.)
Vine with white flowers and milky juice, growing over vegetation on the ridge to the south of Mt. Fao; elevation 600 m.
Coll. Art Whistler
No. W 3252
1
Date 2 Jan.1976

Microphotographs of the above sheet W 3252 follow:

Outside view of a pressed flower enlarged about 8X. Outside corolla surface is finely granulose and glabrous, inside is puberulous. Calyx is small and does not nearly reach the corolla sinuses.

Outside and inside view of the calyx with attached pedicel and on the Right the ovaries showing enlarged about 8X. The pedicel is dark colored 2.5 cm long, terete, glabrous 0.06 cm in diameter. The sepals are oval with rounder apexes 0.16 cm long and 0.10 cm at the widest. Calyx is glabrous inside and out. Ovaries are short domed 0.13 cm tall and the base pair is 0.10 cm wide, glabrous.

Inside view of the flower enlarged about 8X. The coronal lobes do not reach the corolla sinuses. One scale missing here. Corolla surface inside is puberulent; apex glabrous. Not deeply cut.

Sinus - sinus	0.48 cm
Sinus - center	0.38 cm
Sinus - apex	0.55 cm
Apex - center	0.80 cm
Widest	0.52 cm

Flower flattened is 1.60 cm in diameter.

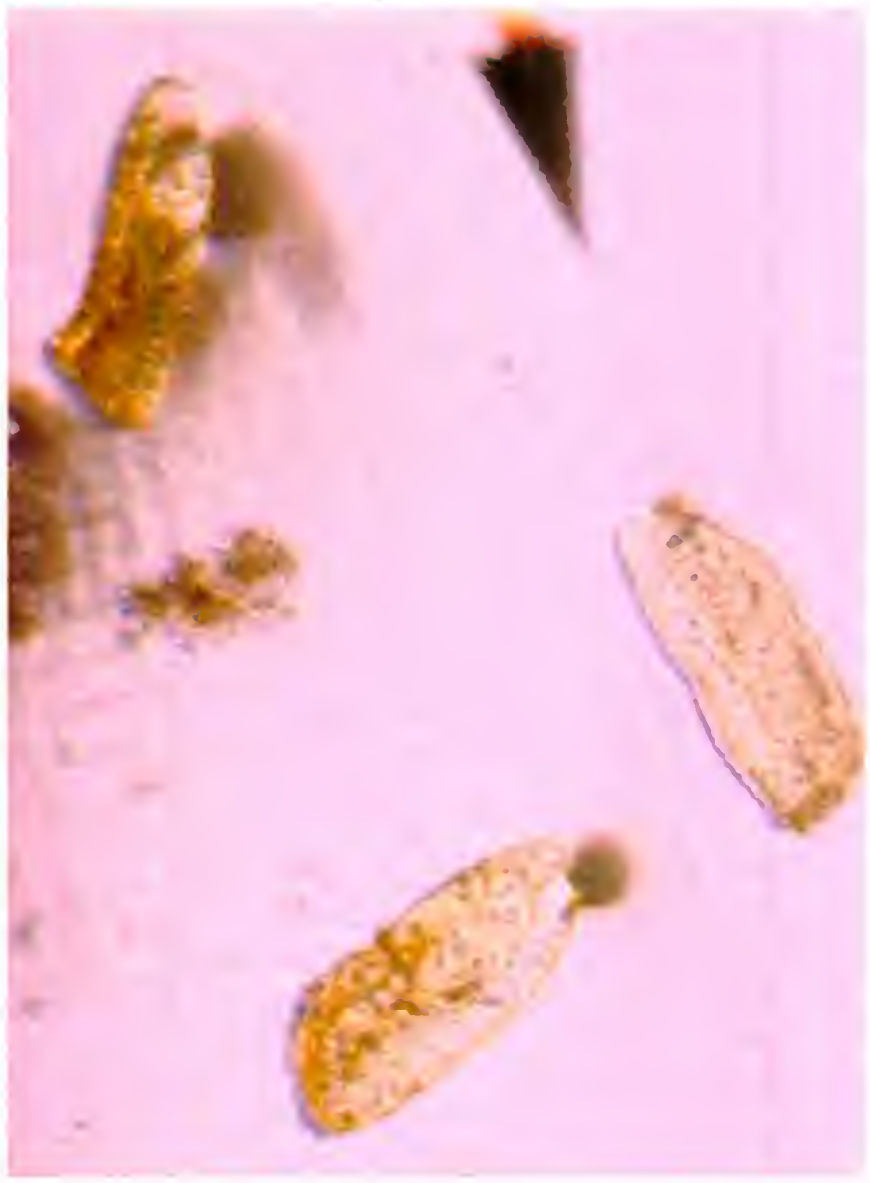
Bottom of the corona enlarged about 16X. The scales are channeled nearly to the central column, sides longitudinally sulcate. Anther wings are very narrow.

Apex - apex and center	0.25 cm
Widest	0.10 cm

Dorsal concave with sharp edges, lower ledge extends to the outer apex. (emarginate).

Anther wing - aw.	0.13 cm

Side view of the coronal scale enlarged about 16X. Inner lobe is raised and longer then the anthers but does not cover them. Dorsal is swayed and tapers up from the low point to the outer apex. Anther wings are narrow and not at all deeply scythe shaped. Scale is relatively thick.



All the pollinia I could find and no retinacula which I assume was very small.

The pollinia are also very small.

length	0.19 mm
widest	0.08 mm

There may be a retinacula under the upper left pollinium and the small dark spot on the lower center could be a retinacula or just a shadow. Only a very few hoyas have pollinium this small.


Hoya betcheri (Schltr.) Schltr.
WHISTLER
Date Dec. 1980
PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hoya filiformis Rech.
Epiphytic vine with white flowers, growing on trees in the marsh just to the west of Mt. Fito; elevation 1050 m.
Coll. Art Whistler
No. W 1981
Date 9 Aug. 1978

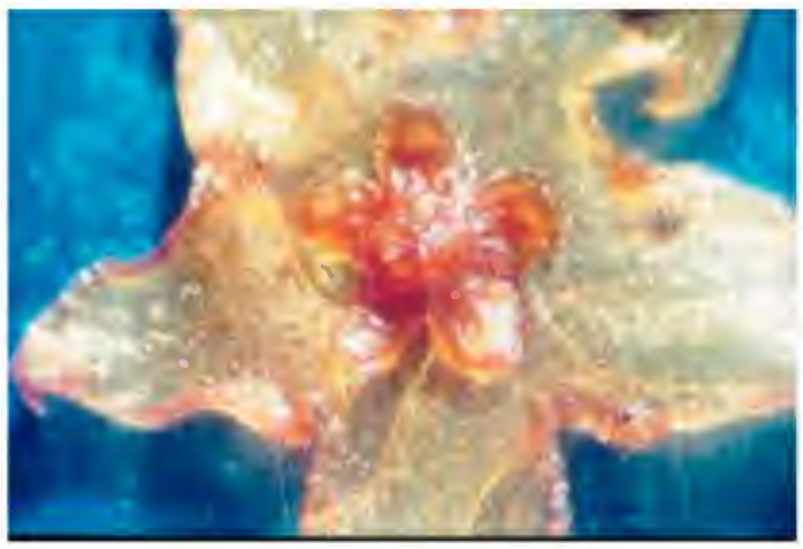
Micro photographs of the flower parts of the above herbarium sheet W 3961:

Side view of the pedicel, calyx and ovaries enlarged about 8X. Pedicel is 1.7 cm long, red-brown, terete, glabrous, 0.06 cm in diameter. The calyx is extremely small, glabrous, dark colored, cupped up when removed form the flower. Sepals with only a few cilia, 0.12 cm long and 0.12 cm at the widest near the base. apex is narrowly rounded. Ovaries are short dome shaped 0.10 cm tall and base pair 0.09 cm wide, glabrous.

Outside surface of the corolla enlarged about 8X. Surface is glabrous. and deeply cut. Lobe apexes are acute, central collar is small thickened and slightly protruding a darker color, 0.01 cm round, 0.03 cm high.

Sinus - sinus	0.35 cm
Sinus - center	0.25 cm
Sinus - apex	0.50 cm
Apex - center	0.70 cm
Widest	0.40 cm

Flower flattened is 1.40 cm in diameter.



Inside view of the flower enlarged about 8X. Corona is glabrous, red and small, lobes do not reach the corolla sinuses. Lobes are slightly conduplicate at the sinus area. Inner and outer lobes are raised swayed near the inner lobes, dorsal seems domed, outer apexes are obtuse. Inner lobe is long and spatulate.

Top view of a coronal lobe enlarged about 16X.

Apex - apex	0.20 cm
Apex - center	0.21 cm
Widest	0.12 cm
Anther wing - aw.	0.12 cm

Corona bottom view enlarged about 8X. The lobes are channeled just to the sinus area; sides are diagonally sulcate. Column is thick and short even with the height of the lobe edges.

Side view of a coronal scale enlarged about 16X. Inner lobe is raised and extended, spatulate, anther is missing, swayed just out from inner lobe with outer lobe obtuse, lower shelves short and do not reach outer apex.

Pollinarium parts enlarged about 165X, again I had difficult to recover the structure for the anthers were unusually attached under the stylar table and retinacula buried beneath and also very narrow so I could not get it to lay flat. Translator can be seen at the bottom end of the pollinia and the clear caudicle over the lower left side of the retinacula which is laying on its side.

Pollinia
- length 0.44 mm
- widest 0.21 mm

Retinaculum
overall length 0.21 mm

Translator
- length 0.09 mm
- depth 0.02 mm

Caudicle bulb diameter 0.07 mm

Description of this herbarium sheet:

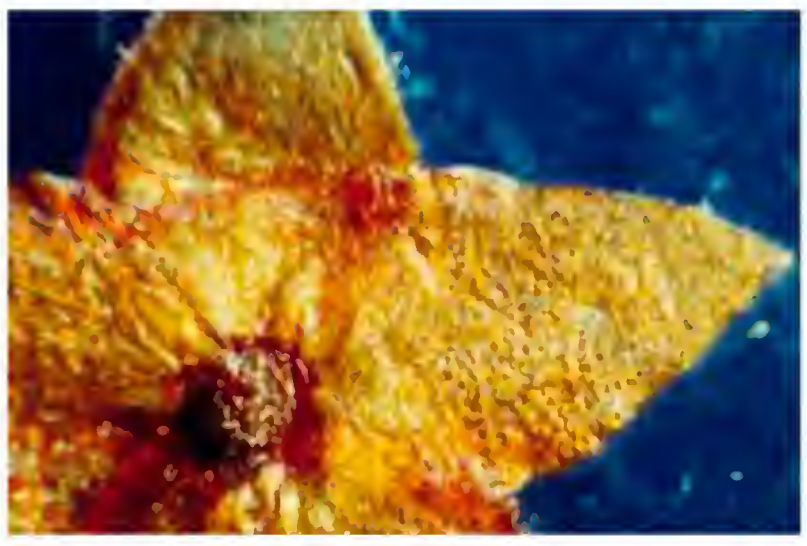
W 3961 29 Aug. 1978 Upolu, Samoa originally as *H. filiformis* Reich. then as *Hoya beitchei* Schltr. dec. 1990. Epiphytic vine with white flowers, growing on trees in the marsh just to the west of Mt. Fito, elevation 1050 m. 1 twice branched stem, 14 leaves 7 peduncles, 3 flowers, and 9 additional pedicels. Leaves narrow elliptic attenuate, apex narrowly rounded, 3.5 - 5.5 cm long, mostly 1.9 cm or narrower in width near the middle, base narrowly somewhat rounded; nerves obscure but pinnate netted some mold on surface on 2 leaves. Petiole grooved above, glabrous, mostly 1 cm long. Internodes glabrous, terete, 2-8 cm long, nodes only slightly enlarged. Peduncles ca. 1 cm long, terete, glabrous, rachis finely bracteate, round, very little larger than the peduncle, fascicled also. Pedicels terete, glabrous, filiform 1.3 cm long. Calyx small dark as are the pedicles. Flowers campanulate, glabrous outside.


Hoya botchei (Schltr.) Schlr.
Art Whistler
Date DEC. 1990
PLANTS OF SAMOA
Coll. Art Whistler
No.

Photo micro-graphs of the flowers from the above herbarium sheet 5714:

View of the corolla outside with pedicel attached enlarged about 8X. The pedicel is short (broken off ?), terete, glabrous, shriveled longitudinally, 1 cm long and 0.06 cm in diameter Corolla outside is granulose and glabrous, deeply cut. Calyx is very small and sepal apexes do not come near the corolla sinuses.

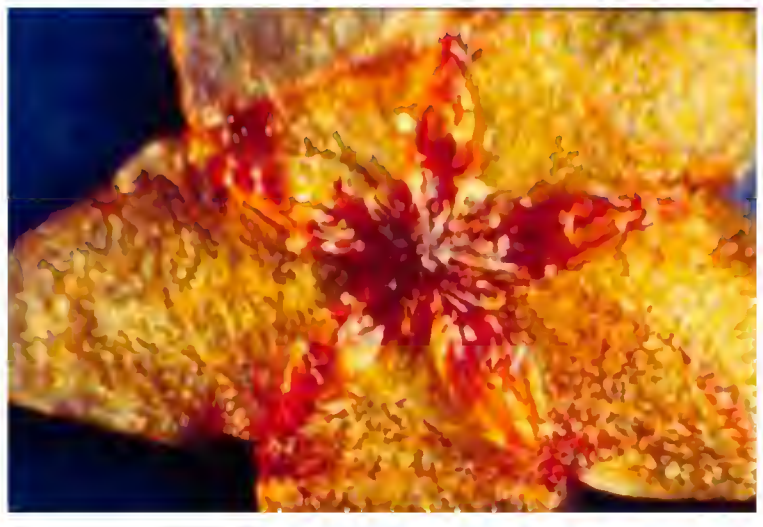
Pedicel and calyx enlarged about 16X. The ovaries stayed with the corolla when this structure was removed. Calyx is ciliate, otherwise glabrous. sepals 0.24 cm long from center - apex; 0.15 cm from base - apex and 0.11 cm at the widest just out from base. Apexes are narrowly rounded to subacute. Outside surface is finely granulose.



Outside surface of the corolla enlarged about 8X. Lobes at sinus area broad to form small conduplicate ears exhibited here as a amber spot at each sinus.

Sinus - sinus	0.42 cm
Sinus - center	0.37 cm
Sinus - Apex	0.50 cm
Apex - center	0.79 cm
Widest	0.45 cm

Flower flattened is 1.58 cm in diameter.



Inside view if the flower enlarged about 8X. Corolla surface is puberulous. Coronal lobes almost reach the corolla sinuses. Inner lobes are tapered and long, very stiff, touch in the center and cover the anthers. Outer apexes are narrowly rounded, tapering from the middle to the apex. Center raised a little, scales nearly horizontal otherwise. Dorsal edges are sharp, slightly concave, longitudinally sulcate.

Bottom view of the corona enlarged about 8X. All surfaces glabrous. Lobes are channeled .

Apex - apex and Center	0.32 cm
Widest	0.15 cm
Anther wing - aw.	0.14 cm
Anther wing - center	0.13 cm
Retinaculum - ret.	0.07 cm
Ret. - center	0.05 cm

Side view of a coronal scale enlarged about 16X. Inner lobe is narrowly rounded and raised, scale is not overly thick in depth. Outer apex slightly sloping downward but dorsal surface is essentially horizontal. Anther wings are not deeply curved nor much thickened.

Corona enlarged about 16X showing the small domed stylar crown after 2 scales have been removed. On the inner apex of the upper right side of the lobe the curved (yellow) anther wing is plainly visible. The dorsal surfaces of the scale upon drying a little seem to have two longitudinal ridges one down each side of the scale. Outer lobe apexes appear to be emarginate.

Retinaculum enlarged about 165X. Translator arm is attached to the right side and appear to enter the retinaculum well down on the side near the well rounded hip area, Extensions are very short.

Pollinarium enlarged about 165X. Pollinia are a little shriveled. The shoulder wings extend back from a rounded head, also the same for the waist area. Caudicles are difficult to discern.

Pollinium

length	0.41 mm
widest	0.20 mm

Retinaculum

length	0.11 mm
shoulders	0.14 mm
waist	0.06 mm
hip	0.12 mm
extensions	0.03 mm

Translators

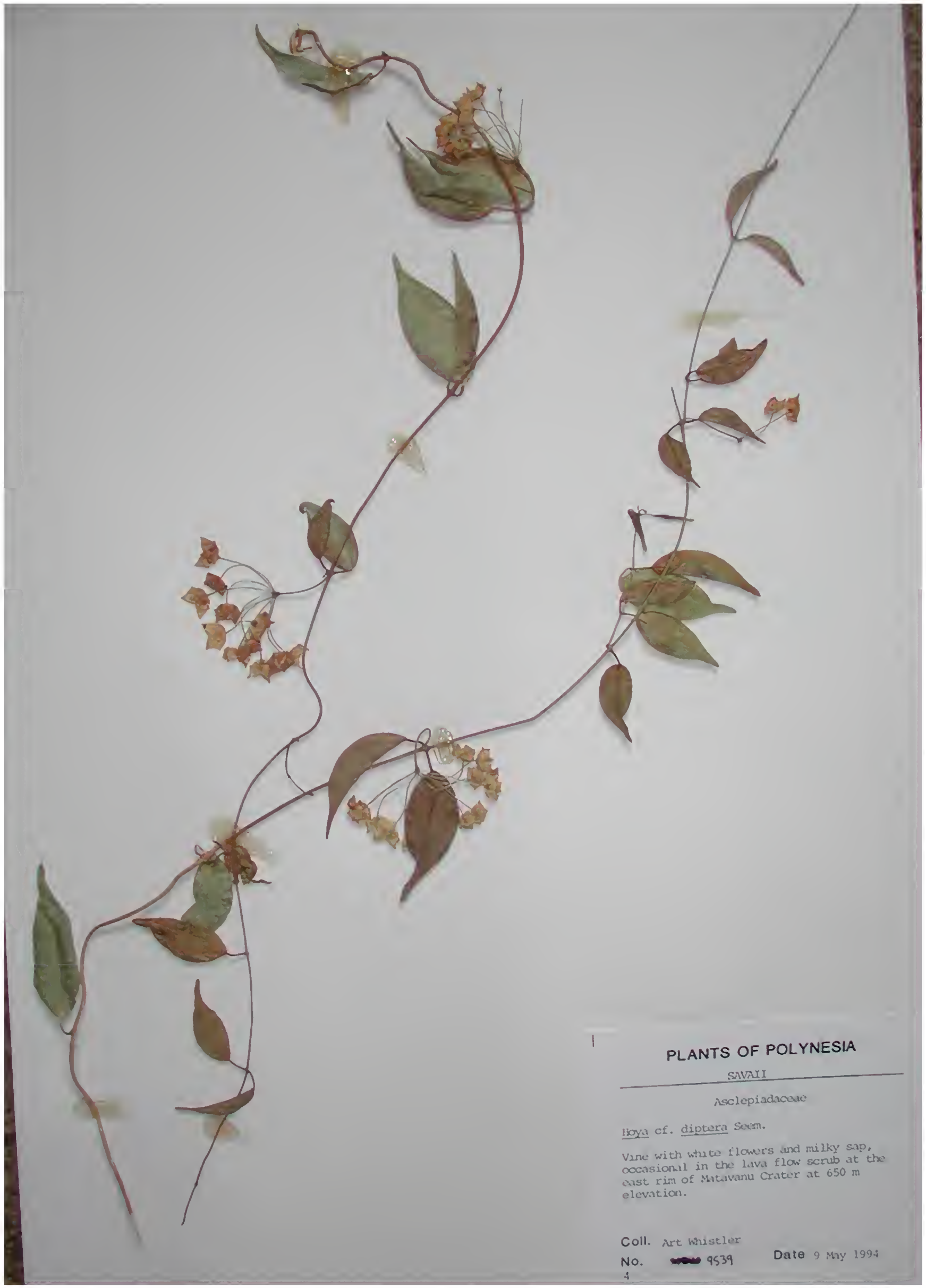
length	0.10 mm
depth	0.02 mm

Caudicle bulb diameter 0.05 mm

Description of the above herbarium sheet:

5714 18 May 1981 Upolu, Samoa. Originally as H. filiformis Reich. then in 1990 determined as H. beitchei Schltr.. Vine with white flowers tinged with pink, occasional climbing in trees in the forest on the north side of Mt. Fao. Elevation ca. 500 m. 1 stem 18 leaves. 1 nice flower cluster, no envelope. 14 flowers, 1 seed pod. Leaves ovate-elliptic shortly apiculate many have folded in half, nerves obscure but pinnate, anastomosing, 4 - 5 cm long x 2.2 cm at the widest in the middle. Petiole 0.5 -0.7 cm long, filiform, same color as stem. Internodes 2.7 - 5 cm long, terete, glabrous, fine, nodes very little enlarged. Peduncle 2.9 cm long, filiform, terete, glabrous, same color as stem. Pedicels terete, filiform occasional hair cells 1.7 cm long. Calyx a little larger, ovate. Corolla campanulate about 1/2 way, glabrous outside; puberulous inside, dark colored. Corona scales long, widest in the middle, acute on both ends, reaching the corolla sinuses. Pod 11 cm long, narrow, darker color from and enlarged pedicel and calyx, rachis and peduncle.

This is not either species as labeled but a new species. Note especially the corona here. Could not possibly be H. filiformis as it is not glabrous and flowers twice as large. Way too many flowers to be H. betchei, also peduncles and pedicels too short and coronal lobes wrong shape and outer lobe emarginate and not obtuse.


PLANTS OF POLYNESIA
SAVAII
Asclepiadaceae
Hoya cf. diptera Seem.
Vine with white flowers and milky sap, occasional in the lava flow scrub at the east rim of Matavanu Crater at 650 m elevation.
Coll. Art Whistler
No. [redacted] 9539
Date 9 May 1994
4

Microphotographs of the flower from herbarium sheet 9539:

Pedicel, calyx and ovaries enlarged about 16X.The pedicel is filiform, 2.4 cm long with a few scattered very fine hair cells, terete, shriveled on drying longitudinally, 0.05 cm in diameter.

Sepals are small, ciliate, not much centrally thickened, membranous, overlapped at the base, tapering toward the rounded outer apex, no ligules. Inside moist or waxy, glabrous. 0.18 cm x 0.10 cm.

Ovaries narrowly dome shaped 0.12 cm tall and base pair 0.10 cm wide, glabrous, waxy.

Top view of the calyx enlarged about 16X, sepals ciliate, apexes mostly rounded, surfaces glabrous. Only a slight basal overlap.

Side view of the flower, enlarged about 8X. the calyx at the corolla base is small and the apexes do not nearly reach the corolla sinuses. Corolla outer surface is glabrous and finely granulose.

Outside view of the corolla enlarged about 8X. Surface is finely granulose, glabrous, lobes triangular, apex acute. Central collar raised 0.03 cm opening 0.10 cm x 0.07 cm

Sinus - sinus	0.45 cm
Sinus - center	0.39 cm
Sinus - apex	0.55 cm
Apex - center	0.81 cm
Widest	0.47 cm

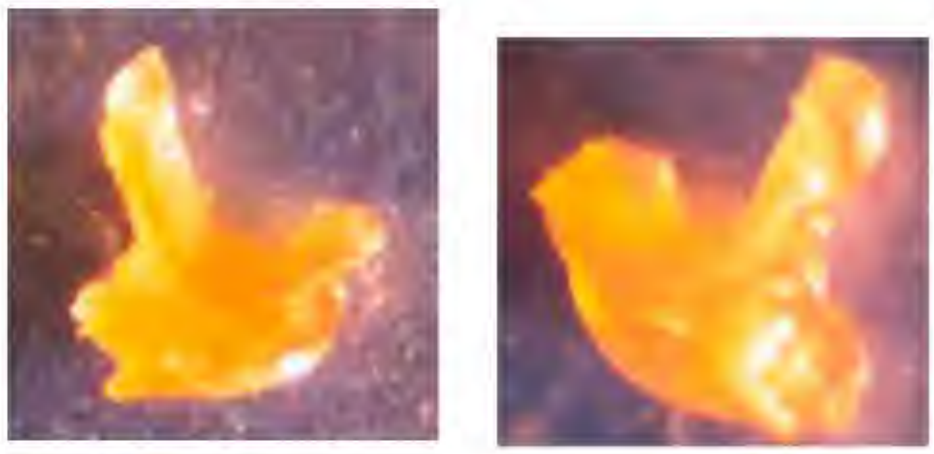
Flower flattened is 1.62 cm in diameter.

Inside view of the flower enlarged about 8X, showing the very small corona. Inside surface of the corolla is very finely puberulent, cut more than half way, sinuses with small turned under ears. Center of corona is sharply raised, inner apexes are spatulate and sides touch each other, retinacula plainly visible, outer apexes broadly rounded, and emarginate dorsal cupped. Anthers in the center are not covered.

Inside view of the corolla with the corona removed, enlarged about 8X. The fine puberlance diminishes toward the center and under the corona it is very sparse or missing. Center is darker colored and slightly raised.

Bottom view of the corona enlarged about 16X. Lobes are channeled nearly to the short central column, 0.04 cm tall, surfaces glabrous. Sides diagonally sulcate. Lower side lobes extend to the apex making it emarginate.

Apex - apex	0.14 cm
Apex - center	0.17 cm
Retinaculum - ret.	0.06 cm



Two views of an individual coronal scale enlarged about 16X.
The anther wings are thickened and moderately scythe shaped. Dorsal is deeply swayed with both apices rising sharply. Lower side lobes are visible especially on the left figure.

Two views of the pollinaria the top one enlarged about 165X.

Pollinium

length	0.55 mm
widest	0.26 mm

Retinaculum

length	0.26 mm
shoulder	0.15 mm
waist	0.05 mm
hip	0.12 mm
extensions	0.04 mm

Translator

length	0.08 mm
depth	0.03 mm

Caudicle bulb
diameter ca. 0.08 mm

Caudicle is difficult to discern.

Description of the above herbarium sheet:

9539 *Hoya cf. diptera* Seem. 9 May 1944. Vine with white flowers and, milky sap, occasionally in the lava low scrub at the rim of Matavanu Crater at 650 m. elevation. 2 fine filiform stems, 1 with 5 pairs of leaves + two single peduncles long pedicels, 1 with 11 flowers 1 with 8 flowers and 12 pedicels. 2nd stem with 8 pairs of leaves & 2 singles, 2 peduncles 1 with 9 flowers the other with 2 flowers. Leaves glabrous, elliptic, attenuate apex 2.5 -5 cm long, 1 - 1.5 cm wide; nerves obscurely pinnate, finely netted, whole plant here fine and delicate with relatively long peduncles & large flowers. Petioles glabrous, 0.5 -0.7 cm long ca 0.1 cm in diameter, grooved above. Peduncle filiform, 1.8 cm long, terete, glabrous, rachis finely bracteate. Pedicels filiform, terete, glabrous, mostly 2 cm long. Calyx very small, less then 1/2 way to the corolla sinuses. Corolla campanulate, glabrous outside, cut 1/2 way or less.

Note: This is most likely to be H. attenuata. It is not H. diptera, filiformis, chlorantha nor H. betchei.

Description of the herbarium sheet below:

#10007 *Hoya diptera* Seemann. 14 May 1996. Vine with milky sap and white or pink flowers, occasionally in the forest on the west rim of Mt. Fito at 1060 m elevation. 2 stems 1 with 3 single leaves; 1 with 1 pair. Envelope with 19 flowers & some pedicels. Leaves glabrous, elliptic, long attenuate apex, base rounded. 5 - 6 cm long x 2.1 - 2.3 cm at the widest. Nerves pinnate at 45° to the midrib, branching before reaching the margins. Petiole 1.3 cm long and 0.01 cm in diameter, grooved above, glabrous. Internodes mostly 9-10 cm long; nodes a little enlarged, stem0.03 + cm in diameter. Peduncle not present. Pedicels glabrous, filiform, dark colored, terete, 2.5 cm long and 0.05 cm in diameter.

Note: This is not H. diptera. Too many flowers/cluster 19 vs. 5-10; pedicels too long 2.5 vs. 0.8-2.0 cm, calyx larger than diptera 0.07-0.11 vs. 0.18 cm also the coronal lobes here are concave on top not full and rounded; the inner lobe is spatulate not dentate.


THE FLORA OF SAMOA
Hoya dioica

Photomicrographs of flower from above herbarium sheet 10007:

Side view of the pedicel, calyx and ovaries enlarged about 16X. Pedicel is 2.5 cm long, 0.04 cm in diameter, terete, glabrous, longitudinal shriveled.

Sepals are thickened centrally, outside granulose, apex acute, no ligules. Dark colored (red). The apexes do not come near the corolla sinuses. 0.18 cm long and 0.08 cm at the widest 0.25 cm from apex to center.

Ovaries narrowly domed 0.10 cm tall and base pair 0.07 cm wide, glabrous.

Top view of the calyx enlarged about 16X, center thickened, otherwise membranous.

Outside view of the corolla enlarged about 8X. Outer surface is glabrous, smooth near center granulose outward. Cut less than half way, apex acute. Central collar with 0.10 cm x 0.09 cm opening, 0.04 cm tall, slightly raised.

Sinus - sinus	0.40 cm
Sinus - center	0.40 cm
Sinus - apex	0.45 cm
Apex - center	0.72 cm
Widest	0.42 cm

Flower flattened is ca. 1.44 cm in diameter.

Inside view of the flower enlarged about 8X. Corolla inside is puberulent, less in the central region under the corona increasing in density outward. Coronal outer apexes reach the corolla sinuses. Coronal inner lobe is long and spatulate widest just out from the inner lobe and tapering from there to narrowly rounded outer apex. Dorsal concave. Anther wings prominent.

Bottom view of 3 coronal scaled enlarged about 8X. scales are channeled down center, glabrous, lower side lobes extend to the apex making it emarginate, column thickened 0.07 cm tall.

Apex - apex	0.37 cm
Apex - center	0.39 cm
Widest	0.15 cm
Anther wing - aw.	0.15 cm
Aw. - center	0.13 cm
Retinaculum - ret.	0.05 cm

Side view of a coronal scale enlarged about 16X. Anther wings are thickened and deeply scythe shaped. Dorsal is horizontal, lower side lobe extend to the outer apex. Scale is relatively thick, glabrous, waxy.

Pollinarium enlarged about 165X.

Pollinia

length	0.52 mm
depth	0.10 mm

Retinaculum

length	0.15 mm
shoulder	0.10 mm
waist	0.05 mm
hips	0.10 mm
extensions	0.03 mm

Translator

length	0.11 mm
depth	ca 0.02 -0.-05 mm

Caudicle bulb

diameter	0.05 mm

Retinaculum below not as enlarged.


FLORA OF SAMOA
UPOLU
Asclepiadaceae
Hoya diptera Seem.
Epiphytic vine with white flowers and
the ba
above the village of
elevation.
Collector: Art Whistler
Number: 10339
Date:
1

Photomicrographs of the flower from the above herbarium sheet # 10339.

Side view of the pedicel. calyx and ovaries enlarged about 8X.

Pedicel very filiform, 2.3 cm long, terete, glabrous, occasionally a hair cell, lenticular, longitudinally shriveled, 0.04 cm in diameter.

Calyx small does not reach the corolla sinuses, ciliate, apex narrowly rounded, ligules present, 0.15 cm long and 0,11 cm at the widest, 0.20 from apex to center.

Ovaries narrowly dome shaped 0.14 cm tall, base pair 0.08 cm wide, glabrous.

Top view of the calyx enlarged about 16X. Described above; centrally thickened otherwise membranous, yellow ligules plainly visible at the sinuses.

Outside view of the corolla enlarged about 8X. Corolla surface glabrous, slightly conduplicate at the sinuses. Central collar much thickened opening 0.10 cm x 0.09 cm 0.03 cm tall darker color.

Sinus - sinus	0.35 cm
Sinus - center	0.25 cm
Sinus - apex	0.48 cm
Apex - center	0.84 cm
Widest	0.40 cm

Flower flattened is 1.68 cm in diameter.

Inside view of the flower enlarged about 8X. Corolla is finely puberulent with centrally there are stiff hair cells pointing inward under the corona. Coronal lobes narrow, thick inner lobes raised and keeled but spatulate, anther wings protrude, dorsal concave, outer apex rounded surfaces are longitudinally sulcate.

Top view of the corona enlarged about 8X. Surfaces are glabrous. Center raised, otherwise horizontal.

Apex - apex	0.25 cm
Apex - center	0.28 cm
Widest	0.10 cm

Bottom view of the corona enlarged about 8X. Lower side of lobes are channeled all the way to the column.

Side view of a coronal scale enlarged about 16X. Inner lobe almost straight up, with central anther overtopping it. Scale rather thick, lower side lobes appear not to reach the outer apex. Anther wing thickened and a little curved.

Description of this herbarium sheet.

10339 *Hoya diptera* Seemann. Epiphytic vine with white flowers red base, uncommon in the ridge forest above the village of Uafato at 400 m. elevation. 3 April 1997. 1 stem branched 2 pairs of leaves 3 singles, 2 peduncles 1 with a long rachis, 1 pedicel 1 with short rachis 3 pedicels 1 flower. Envelope with leaf , 7 flowers, numerous pedicels. Leaves small ovate, glabrous, with long attenuate apex, base obtuse 4.5 - 6.3 cm long mostly 2-2.3 cm at the widest near the middle, nerves obscure pinnate, midrib below. Petioles glabrous, fine 0.8 - 1.0 cm long, grooved above. Internodes 5.5 - 7 cm long; stem fine, terete, glabrous 0.2 cm in diameter, nodes a little enlarged. Peduncle 4.0 cm long terete, glabrous, 0.01 cm, in diameter, rachis tubular finely fascicled, glabrous. Pedicles 2.2 cm long, filiform, glabrous, terete; extremely fine.

Note: This is not H. diptera. Inner lobe of corona is spatulate not dentate, dorsal is cupped not rounded (convex), lobes do not reach the corolla sinuses.

Pollinarium enlarged about 165X.

Pollinium
- length 0.51 mm
- widest 0.20 mm

Retinaculum
- length 0.12 mm
- shoulders 0.11 mm
- waist 0.05 mm
- hip 0.08 mm
- extensions 0.04 mm

Translators
- length 0.09 mm
- depth 0.01 + mm

Caudicle bulb
- diameter 0.05 mm

Calyx comparisons in cm

	Sepals length x width	to Corolla sinuses	Ligules	
W 1106				
W 1617	0.13 x 0.10	ciliate	1/4 way	dark 5
W 1983	0.10 x	ciliate	1/4 way	dark 5 small
W 2643	0.11 x 0.13	ciliate	1/4 way	
W 3252	small	all glabrous	1/4 way	
W 3961	0.12 x 0.12	few cilia	1/4 way	
5714	small	all glabrous	1/4 way	none
9539		ciliate		
10007	0.18 x 0.08	all glabrous	1/2 -	none
10339	0.15 x 0.11	ciliate	1/2 +	yes 5

Corolla comparisons in cm

	Sinus - sinus	Sinus - Center	Sinus - apex	Apex - center	Widest
W 1106	0.30	0.20	0.42	0.60	0.40
W 1617	0.20	0.38	0.40	0.60	
W 1983	0.38	0.32	0.68	0.85	0.50
W 2643	0.45	0.40	0.52	0.80	0.51
W 3252	0.48	0.38	0.55	0.80	0.52
W 3961	0.35	0.25	0.50	0.70	0.40
5714	0.42	0.37	0.50	0.79	0.45
9539	0.45	0.39	0.55	0.81	0.47
10007	0.40	0.40	0.45	0.72	0.42
10339	0.35	0.25	0.48	0.84	0.40

Corona comparisons in cm

	Apex - apex	Apex - center	Widest	Aw. - aw.	Aw -Cet.	Ret. - ret.
W 1106	0.20	0.20	0.08			
W 1617	0.20	0.22				
W 1983	0.33	0.33	0.10	0.14		0.07
W 2643	0.18	0.18		0.12	0.10	0.05
W 3252	0.25	0.25	0.10	0.13		
W 3961	0.20	0.21	0.12	0.12		
5714	0.32	0.32	0.14	0.13	0.07	0.05
9539	0.14	0.17			0.06	
10007	0.37	0.39	0.15	0.15	0.13	0.05
10339	0.25	0.28	0.10			

Vegetative comparisons in cm:

	leaves	peduncle	pedicel	Flower #/color	Elevation
W 1106	4.5 - 7.5 x 2 - 2.5	3.2	2 - 2.2	/white	600m
W 1617	4.5 - 5.5 x 1.5 - 2	1 - 1.6	1.5 -1.7	/white	700m
W 1983	4.5 - 5 x 1 - 1.3	2.7 - 3.5	2.5	12/pale green	250m
W 2643	4 - 4.5 x 1 - 1.2	.8 - 1	2	5 ?/white	1550m
W 3252	5.6 - 6 x 1.4	1	2.4	10/reddish	400m
W 3961	3 - 3.5 x 1.9	1	1.3	10?/white	1050m
5714	4 - 5 x 2.2	2.9	1.7	14/white	500m
9539	2.5 - 5 x 1 - 1.5	1.8	2	16-20/white	650m
10007	5 - 6 X 2.1 - 2.3		2.5	19+/white-pnk	1000m
10339	4.5 - 6.3 x 2 - 2.3			/white-red	400m

Pollinarium comparisons in mm

	W 1106	W 1617	W1983	W2643	W3252
Pollinium					
length	0.52	0.49	0.75	0.37	0.19
widest	0.21	0.18	0.25	0.18	0.08
Retinaculum					
length	0.18	0.17	0.21	0.15	
shoulder	0.09	0.14	0.17	0.12	
waist	0.05	0.05	0.09	0.05	
hip	0.08	0.05	0.12	0.08	
extensions	0.03	0.03	0.05	0.05	
Translator					
length	0.10	0.08			
depth	0.04	0.03			
Caudicle					
bulb diam.	0.05	0.07		0.04	

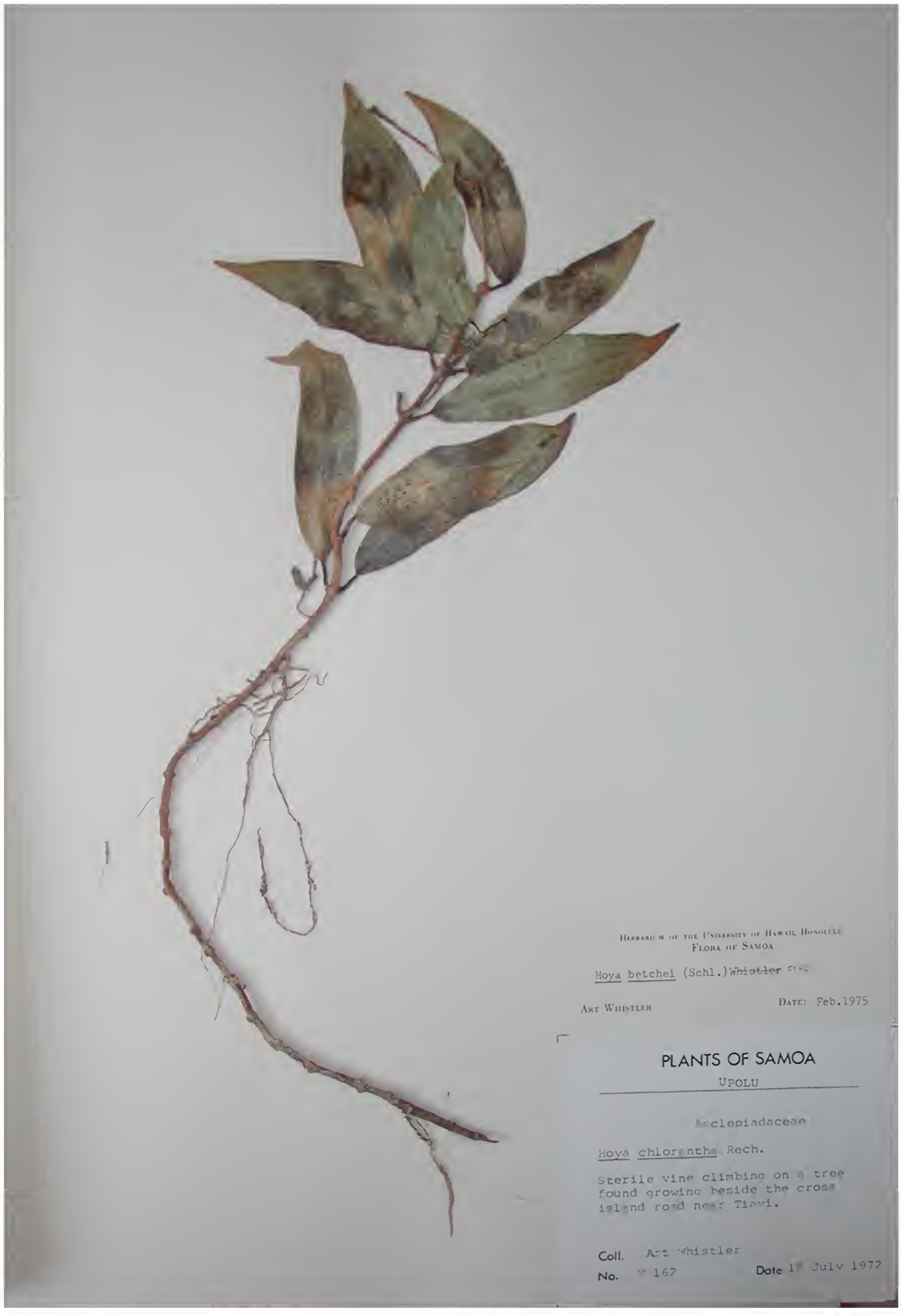
	W3961	5714	9539	10007	10339
Pollinium					
length	0.44	0.41	0.55	0.52	0.51
widest	0.21	0.20	0.26	0.10	0.20
Retinaculum					
length	0.21	0.11	0.26	0.15	0.12
shoulder		0.14	0.15	0.10	0.11
waist		0.06	0.05	0.05	0.05
hip		0.12	0.12	0.10	0.08
extensions		0.03	0.04	0.03	0.04
Translator					
length	0.09	0.10	0.08	0.11	0.09
depth	0.02	0.02	0.03	0.25	0.01+
Caudicle					
bulb diam.	0.07	0.05		0.05	0.05

Samoan Hoya's Fourth Folder

List of sheets: (20)		Labeled	Determined
W 162		chlorantha/betchei	no flowers so no determination.
W 344	*	chlorantha/betchei	probably correct.
445		betchei	not betchei maybe attenuata.
W 477		chlorantha/betchei	not chlorantha (campanulate) betchei.
W 1796	*	chlorantha/betchei	not betchei, no ligules, calyx ciliate, pedicels too long, inner lobe spatulate.
W 2765	*	betchei	**New Sp.** Not campanulate, outer lobe emarginate, inner lobe spatulate.
W 2793	*	betchei	not betchei, peduncles and pedicels too short, elevation too low not determinable.
3645		betchei	no flowers no determination.
W 3110	*	betchei (tutuilensis)	not tutuilensis. coronal lobes here 0.43 vs. 0.25, campanulate, peduncles and pedicels too short, coronal lobed different, inner lobe spatulate, lobes keeled on dorsal, no ligules ?
W 3111	*	betchei	most likely chlorantha, flower flat and first bloom
W 3243	*	betchei	appears to be correct yet peduncle very short. ? also coronal lobed concave not convex.
W 3245	*	betchei	probably correct yet retinaculum large, and inner lobe spatulate.
W 4443	*	betchei	as above.
W 5165	*	betchei	as above. all with retinacula too large.
6871		betchei	undetermined
7020		betchei	undetermined
8232	*	vitiensis	calyx and leaves different; not vitiensis, corolla campanulate.
8366		vitiensis	undetermined but not vitiensis as campanulate
8717	*	vitiensis	**H. fetuana** Kloppenburg
10477	*	vitensis	corolla not villous, if campanulate possibly betchei id flat this is first bloom so most likely H. chlorantha.

*** Flowers from herbarium sheets studied.**

Data and photos of flower parts of each sheet follows, for those sheets with loose flowers. Sheets have been reduced to scan and place in this file. Each sheet has a dark 1" square to show the relative size. Sheets are 11.5" x 16.5" in the natural state.


Herbarium of the University of Hawaii, Honolulu
Flora of Samoa
Hoya betchei (Schl.) Whistler
Art Whistler
Date: Feb.1975
PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hoya chlorantha Rech.
Sterile vine climbing on a tree found growing beside the cross island road near Tiavi.
Coll. Art Whistler
No. 162
Date 1st July 1972

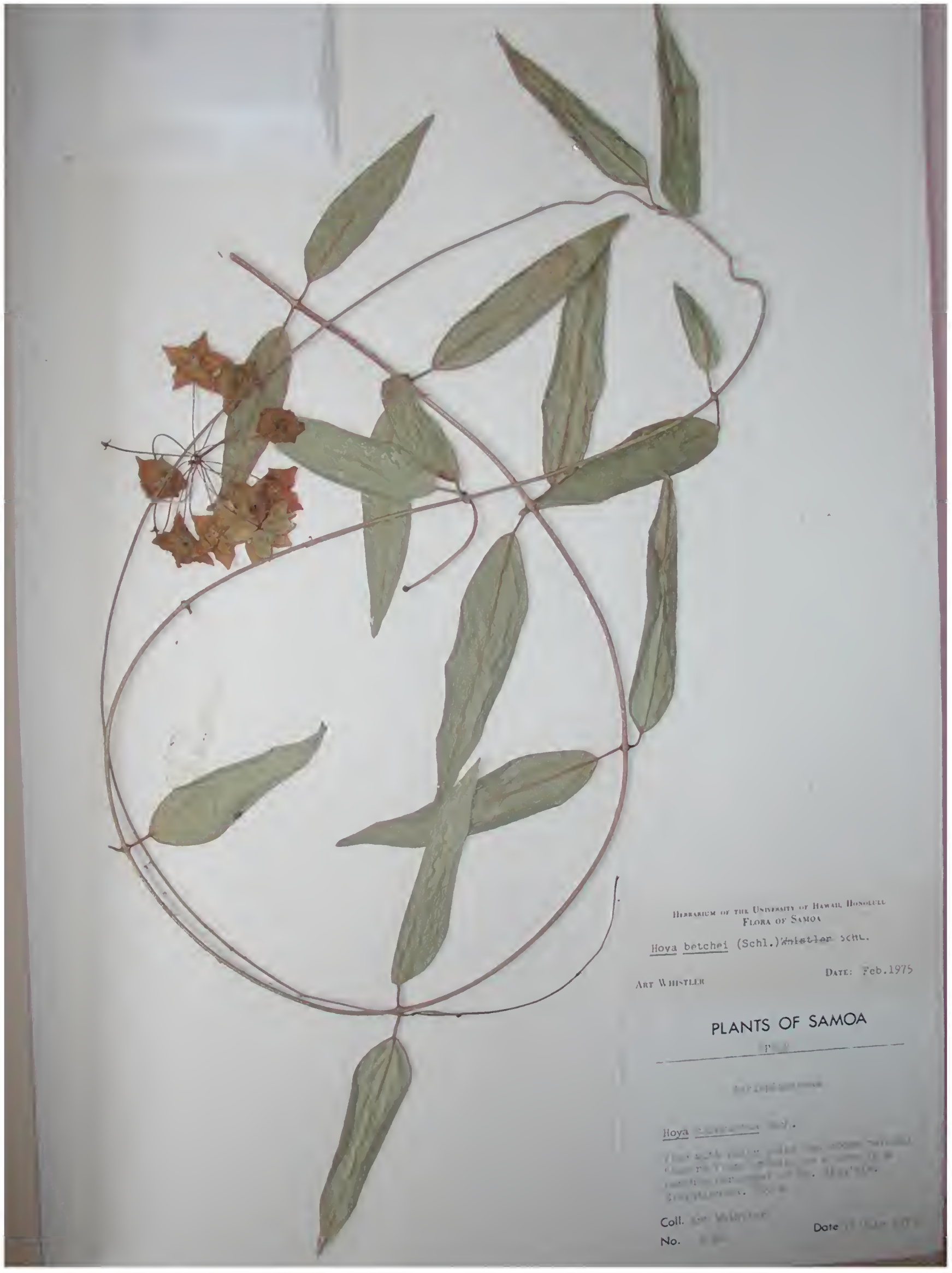
Description of Herbarium sheet above W 162:

Hoya chlorantha Reich. 18 July 1972, determined Feb. 1975 as *Hoya betchei* (Schltr.) Whistler. Uoplu, Samoa. Sterile vine climbing on a tree found growing beside the cross Island road near Tiavi. 1 stem lower 2/3 rooted. 8 leaves, 1 peduncle + long pedicel. Leaves Salix-like, elliptic attenuate, apex acute to a little rounded, base narrowly rounded, glabrous, stained black with fungus spores. 6.7 - 8 cm long x 1.7 - 2.3 cm at the widest near the middle. Petiole dark colored 0.5 - 0.7 cm long, glabrous, grooved above. Internodes 1.3 - 2/3 cm long, terete, glabrous, nodes a little enlarged, medium brown. Peduncles (2), terete, glabrous 3.2 cm long, 0.1 cm in diameter enlarged and curved apically, has flowered only once. Pedicel 3.8 cm long, terete, glabrous, covered with fungus.

Description of Herbarium sheet bellow W 344:

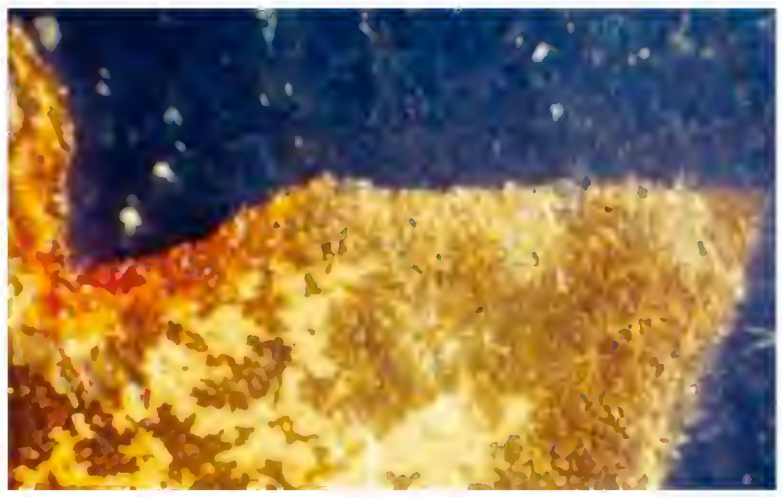
Hoya chlorantha Reich 19 July 1973, determined as *Hoya betchei* (Schltr.) Whistler, Feb. 1975. Upolu, Samoa. Vine with milky juice & cream colored flowers growing on a tree in a pasture northwest of Mt. Sigaele. Elevation 500 m. 1 long curled stem 19 leaves 1 flower cluster (17 flowers). Leaves Salix-like narrowly elliptic attenuate, outspread, glabrous, edges roll under, midrib exposed below, texture thin, slate green, 6.5 - 8.5 cm long x 1.5 - 2 cm at the widest, nervation more prominent above than below, pinnately netted. Petioles thin narrow, 0.7 cm long, do not appear to be grooved above, glabrous. Internodes 5.5 - 11.5 cm long, terete, glabrous, ca. 0.11 cm in diameter, nodes very slightly enlarged. Peduncle 3.5 cm long, heavier then the petiole, terete, glabrous, first bloom. Pedicels long, filiform, terete, glabrous, 2.8 cm long. Calyx not too small, ovate, does not reach the corolla sinus. Corolla campanulate, large, cut 1/2 way, glabrous outside, inside marginately pubescent. center glabrous. Corona glabrous, narrowly elliptic raised and do not reach the corolla sinuses, with lower side lobes; outer apex emarginate, rounded; inner apex long, pointed.

Note: campanulate so not chlorantha. undetermined, peduncles a little short of betchei and retinaculum large but flower size fine at 3.0 cm


Herbarium of the University of Hawaii Honolulu
Flora of Samoa
Hoya botchei (Schl.) ~~Whistler~~ Schl.
Art Whistler
Date: Feb. 1975
PLANTS OF SAMOA
Hoya
Coll.
No.
Date

Photomicrographs of flowers from the above herbarium sheet W 344.

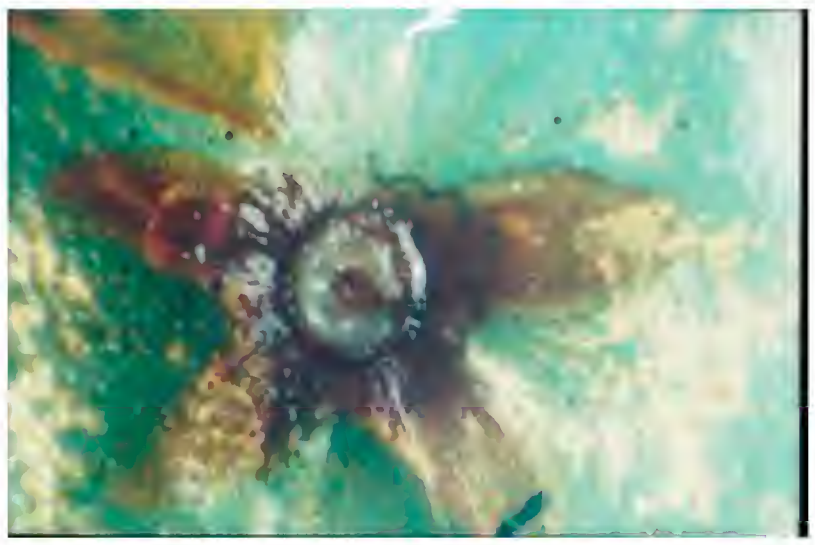
No Pedicel available:
No Calyx:



Corolla outside surface (lobe apex) enlarged about 8X. Apex acute turns under on drying. Sinus with small conduplicate edges, surface is granulose, glabrous.

Sinus - sinus	0.90 cm
Sinus - center	0.75 cm
Sinus - apex	0.98 cm
Apex - center	1.50 cm
Widest	1.03 cm

Flower flattened is 3 cm in diameter.



Outside surface of the corolla at the center enlarged about 8X. Corona shows through the Kew solution soaked flower. In the center there is a mushy white substance, possibly milky sap exudates. Collar is thickened, opening is 0.15 cm x 0.14 cm and 0.03 cm tall, dark colored.

Inside view of the corolla at the sinus enlarged about 8X. Conduplicate a little at the sinus, Coronal lobes do not nearly reach the sinuses; are dark colored. Inner corolla surface is marginally pubescent decreasing in length toward the center where it is glabrous.

Top view of the corona enlarged about 8X. Center is raised, lobes are narrow, inner lobe spatulate, outer apex rounded and emarginate, dorsal is concave with sharp edges.

Apex - apex	0.48 cm
Widest	0.15 cm
Anther Wing - aw.	0.22 cm
Aw. - center	0.18 cm
Retinaculum - ret.	0.15 cm

Bottom view of the corona enlarged about 8X. Scaled are channeled all the way to the central column. Again there is a waxy substance (showing here as yellow, actually a milky white) in the center, side lobes are broad and flat. Anther wings are thick.

Side view of a scale enlarged about 16X.Actually the dorsal surface is nearly horizontal and the inner apex raised, although the inner lobes touch the anthers protrude above them. Anther winds are deeply scythe shaped; lower side lobes are shelf-like and extend to the outer apex.

Pollinarium enlarged about 165X. The retinaculum is turned on the axis of the translators and caudicle so the head here is pointed down.

Pollinia

length	0.74 mm
widest	0.23 mm

Retinaculum

length	0.37 mm
shoulder	0.26 mm
waist	0.10 mm
hip	0.14 mm
ext.	0.04 mm

Translator

length	0.18 mm
depth	0.03 mm

Caudicle bulb

diameter	0.10 mm

A better view of the retinaculum and the translator arms. This is a large retinaculum.

Single pollinium enlarged about 165X. The dark arrows are 0.10 mm long and the stem is 0.02 mm wide.


Herbarium of the University of Hawaii, Honolulu
Hoya betchei (Schltr.) Schltr.
Art Whistler
Date: Dec. 1990
EX MUSEO BOTANICO BEROLINENSI

Description from the above herbarium sheet 445. (B).

20 April 1906 F. Vaupel. Determined 1990 by Art Whistler as *Hoya betchei* (Schlechter) Whistler. Panafu, Samoa. 1 stem, 3 peduncles, 1 detached with 1 flower. (20 flowers). Salix- like leaves. Leaves elliptic-attenuate, glabrous, apex acute to a little rounded, bases rounded 5.5 - 0.7 cm long x 1.5 - 2.2 cm widest near the middle, edges narrowly turned under, nervation obscure, 2 pairs of basal nerves one above the other extending about 1/2 way up the blade, otherwise pinnately nerved, netted, midrib protrudes below and is lighter colored. Petiole short 0.70 cm long, a little darker, glabrous, grooved above, 0.12 cm in diameter, curved apically. Internodes short 1 - 4 cm long, 0.2 cm in diameter, terete, glabrous, light buff color, nodes a little enlarged. Peduncle 3.2 cm long, ca. 0.1 cm in diameter, terete, glabrous, same color as stems; rachis larger, finely and densely bracteate, tapering, round, glabrous, 0.5 cm long. Pedicel filiform, here ca. 1.2 cm long.

Note: not betchei, too many flowers/cluster and too small, pedicels too short. May be H. attenuata.

Description from the below herbarium sheet W 477.

Hoya chlorantha Reich. 12 Aug. 1973, determined as *Hoya betchei* (Schltr.) Whistler Feb 1975. Vine with white flowers growing on trees on the lave fields inland from Vaipouli, Savai'i, Samoa. (Western). 1 stem, 8 pairs of leaves and umbel; 1 short stem 1 pr. leaves; mature pod. Leaves elliptic attenuate, 5.5 - 7.5 cm long x 1.5 - 2 cm widest, apex acute, base rounded, nerves more visible above, 2 basal anastomosing and pinnate (triplinerved a little up from the base), glabrous, thin, edges rolled slightly. Petioles glabrous, about the same color as the stem, 0.3-0.5 cm long, grooved above. Internodes glabrous, terete, 1 - 4 cm long, 1.5 cm in diameter, nodes very slightly enlarged. Peduncle 2.5 cm long, fine, terete, glabrous, 0.1 cm or less in diameter. Pedicles darker brown color (other parts buff colored), glabrous, terete, filiform, 3 cm long. Calyx small, ovate, glabrous outside, not even 1/2 way to the corolla sinuses. Corolla campanulate, 1st blooming, glabrous, rimmed pubescent inside, center glabrous (14) flowers. Pod from peduncle 3 cm long with enlarged rachis 0.3 cm long fascicled. Pedicel dark as is the pod, 10 cm long, just starting to split with small calyx present.

Note: flower is campanulate so not chlorantha, possibly betchei.


Herbarium of the University of Hawaii, Honolulu
Flora of Samoa
Hoya botchei (Schl.)
Art Whistler
Date: Feb.1975
PLANTS OF SAMOA
Coll.
No.
Date


Herbarium of the University of Hawaii, Honolulu
Flora of Samoa
Hova botchei (Schl.) Whistler comb.
Art Whistler
Date: Feb. 1975
PLANTS OF SAMOA
Coll.
No.
Date

Photomicrographs and data from flowers on Herbarium sheet above, W 1796:

Pedicel, calyx and ovaries side view enlarged about 8X.

Pedicel is red-black, long curved slightly, 1st bloom, 4.0 cm long creased longitudinally (from drying) 0.05 cm in diameter.

Calyx dark. densely ciliate, overlapping at the base. 0.15 cm long and 0.14 cm at the widest, 0.23 from apex to the center.

Ovaries narrowly domed 0.12 cm tall and base pair 0.10 cm wide, glabrous.

Calyx top view enlarged about 16X, edged very ciliate centrally darker in color and sepals thickened centrally. Apex narrowly rounded. No ligules observed.

Outside surface of the corolla enlarged about 8X. Surface is glabrous, center collar thickened, oval reddish colored, 0.14 cm x 0.13 cm Sinus area slightly eared (conduplicate), corona showing through damp surface.

Outer surface at the corolla lobe area enlarged about 8X. Apex is acute.

Sinus - sinus	0.75 cm
Sinus - center	0.67 cm
Sinus - apex	0.75 cm
Apex - center	1.15 cm
Widest	0.80 cm

Flower flattened is 2.30 cm in diameter.

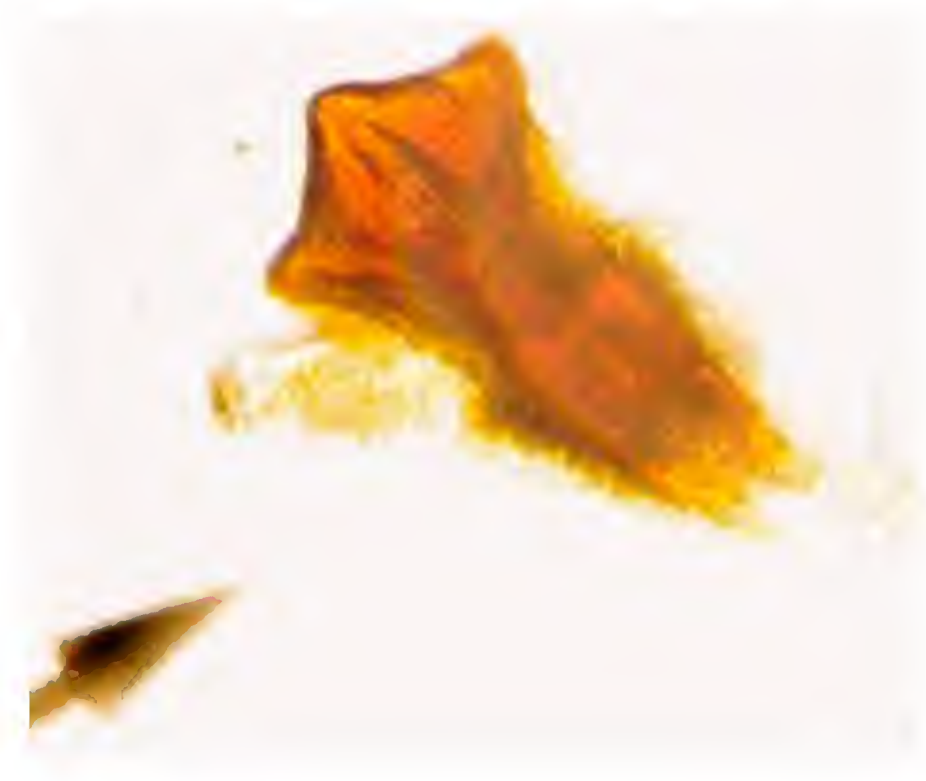
Inside surface of the flower enlarged about 8X. Corolla surface is pubescent marginally to the sinus area, glabrous internally. A few still hairs under the corona center radiating outward. Corona center is raised, inner lobes are spatulate and touch in the center, dorsal narrow and slightly concave with central ridge, 0.17 cm wide. Inner lobe with slight keeled top

Apex - apex	0.25 cm

Bottom view of the corona enlarged about 8X. Lobes are channeled clear to the central column. Lower side lobes are rather flat and extend to the outer apex leaving it emarginate. Anther wings are narrow and extended. Column short.

Anther wing - aw.	0.20 cm
Aw. - center	0.18 cm
Retinaculum - ret.	0.11 cm

Coronal scale side view enlarged about 16X. Inner lobe raised, slightly keeled above, dorsal rather horizontal, lower side lobes from the anther wing area to the apex. Anther wings not too deeply curved.



Retinaculum enlarged about 165X. One translator attached to the left.

length	0.27 mm
shoulders	0.18 mm
waist	0.08 mm
hips	0.14 mm
extensions	0.05 mm

Translator

length	0.15 mm
depth	0.03 mm

Caudicle bulb

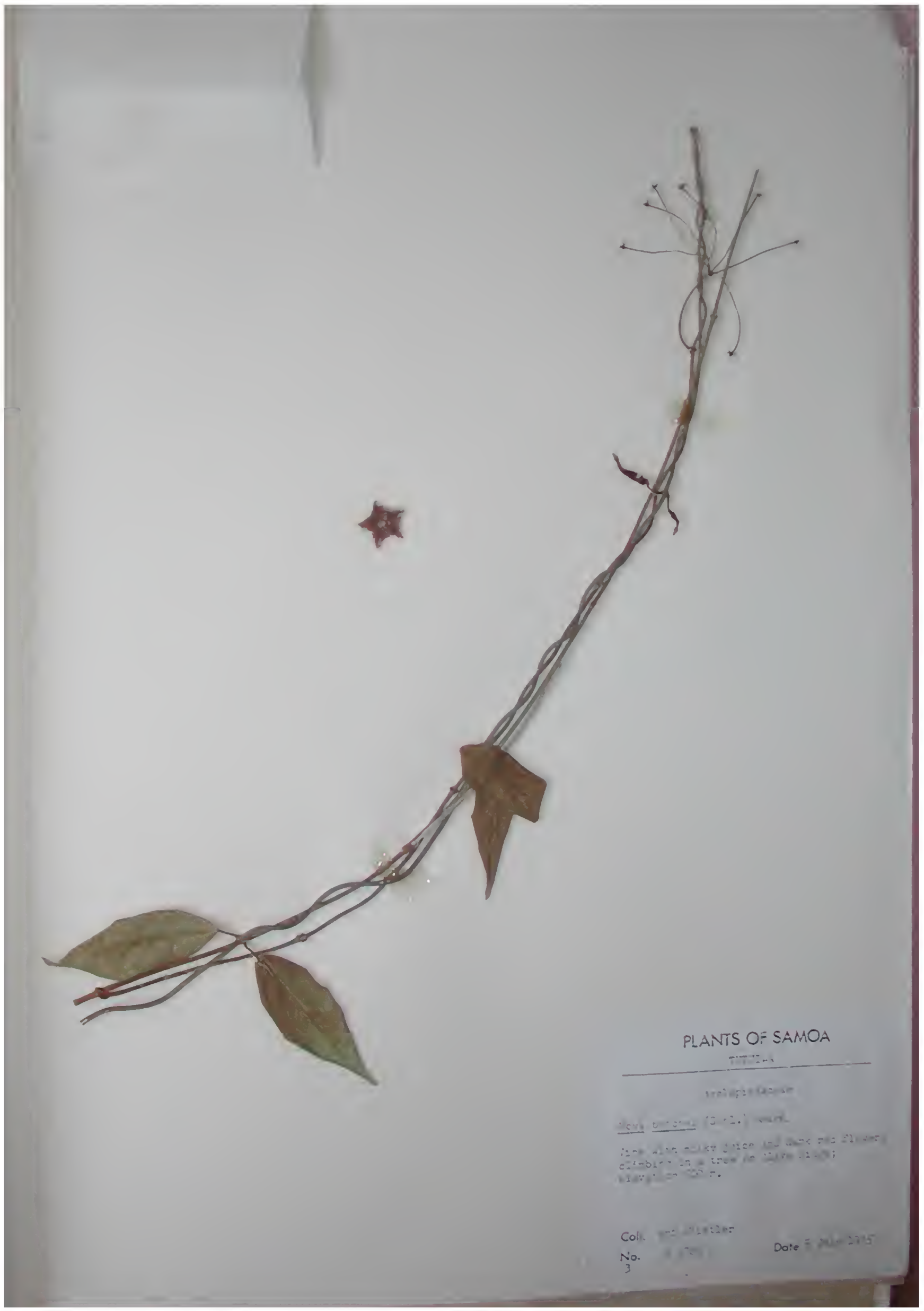
diam.	0.03 mm it is somewhat flattened.

Pollinarium enlarged about 165X. A foreign object lays to the left above the dark retinaculum.

length	0.73 mm
widest	0.24 mm

Description of the above herbarium sheet (W 1796).

Hoya chlorantha Reich. 13 March 1974, det. Feb. 1975 as *Hoya betchei* (Schltr.) Whistler. Savai'i, Samoa. Vine with milky juice and yellow-green hairy flowers, climbing in a tree along the Patamea River bed near Patamea. 1 stem 7 leaves. 1 pod. 1 stem 1 leaf and peduncle with pedicels. 3 glued on flowers Envelope with 9 flowers 3 pedicels. Leaves glabrous, elliptic attenuate 5.5 - 9.2 cm long x 1.7 - 2.8 cm widest, texture very thin, pinnate nerves, very netted. visible on both surfaces, midrib extended below, apex acute, base narrowly rounded to sub-cuneate. Petioles fine, glabrous, grooved above 0.8 - 1 cm long. Internodes 4 - 14 cm long, ca. 0.18 cm in diameter, terete, glabrous, nodes barely enlarged. Peduncle 8 cm long, terete, glabrous ca. size of the stem, 1st blooming. from fascicled rachis. Pedicels filiform, long, terete, glabrous, 4.4 cm long. Calyx ovate triangular. Corolla glabrous outside, campanulate. **Note**: not chlorantha, campanulate.


PLANTS OF SAMOA
Coll.
No.
3
Date

Picture from slide taken by Dr. Art Whistler W 2765

Description of the herbarium sheet W 2765:

Hoya betchei (Schltr.) Whistler. 5 July 1975. Tutuila, Samoa. Vine with milky juice and dark red flowers, climbing in a tree on the Alava Ridge; elevation 500 m. 1 branched stem + 1 intertwining 2 pairs of leaves 1 small pair developing, 1 peduncle, 7 pedicels, 1 flower separate. Envelope 2 flowers 1 pedicel. Leaves short elliptic attenuate 5.3 - 5.5 cm long, thin but possibly a little fleshy, apex subacute, base rounded 1.2 - 2 cm at the widest near the middle; midrib narrow, visible below, pinnate netted nerves all the way to the apex. Petioles fine 0.5 cm long, grooved above. Internodes 6 - 10.2 cm long, terete, glabrous, 0.12 cm in diameter, nodes slightly enlarged. Peduncle 1/2 diameter of stem, a little longer than pedicels ca. 3 cm long, terete, glabrous, first bloom from fine bracteoles. (leaves on herbarium sheet look different than in picture above ?).
Pedicels filiform, terete, glabrous, 3 cm long. Calyx small. Corolla glabrous outside, cut more than half way, marginally pubescent in a narrow border otherwise glabrous. Corona

glabrous, narrowly elliptic, outer apex rounded, almost reaching the corolla sinus; dorsal concave with slight keel. **New sp. H. fetuana.**

Photomicrographs and data from the flower from the herbarium sheet W 2765:

Pedicel, calyx and ovaries side view enlarged about 8X.

Pedicle curved, terete, glabrous, 3.1 cm long, translucent 0.06 cm in diameter.

Calyx glabrous, ligules present, an occasional cilia, 0.17 cm long, 0.16 cm at the widest. apex narrowly obtuse, overlap ca. 1/4.

Ovaries short domed, 0.10 cm tall and base pair 0.10 cm wide, glabrous.

Top view of the calyx and ovaries enlarged about 16X. rather membranous, ovaries very stubby; occasional cilia.

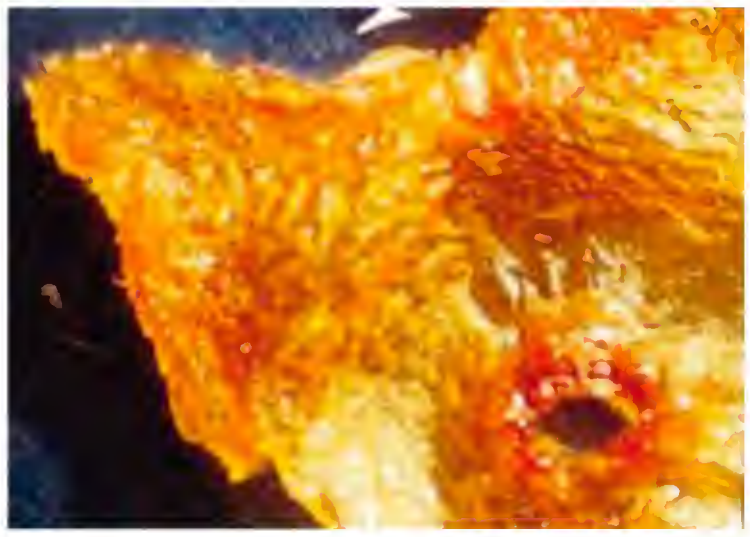
Corolla outside enlarged about 8X, surface is glabrous and granulose, lobes deeply cut, apex acute. collar a little thickened.

Sinus - sinus	0.80 cm
Sinus - center	0.43 cm
Sinus - apex	0.65 cm
Apex - center	0.95 cm
Widest	0.84 cm

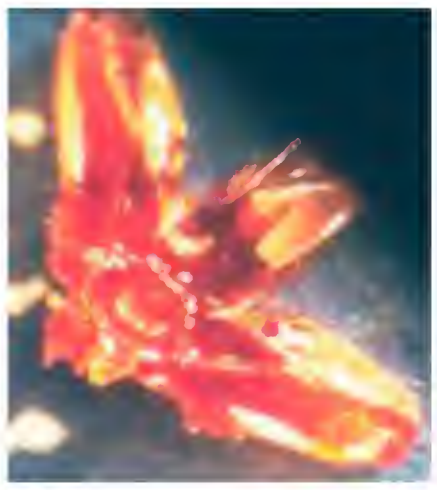
Flower flattened is 1.90 cm in diameter.

Inside view of the flower enlarged about 8X. Corolla surface is marginately pubescent and covering most of the lobe otherwise glabrous. Corona center raised with inner lobes spatulate touching in the center, glabrous. Outer apex emarginate, rounded.

Apex - apex	0.40 cm
Widest	0.15 cm
Anther wing - aw.	0.20 cm
Aw. - center	0.20 cm
Retinaculum - ret.	0.10 cm
Ret. - center	0.08 cm



Corolla inside view with the corona removed enlarged about 8X. Note the pubescent on the lobes but not in the central region.



Lower side of the corona with 2 lobes remover enlarged about 8X. Lobes are channeled all the way to the short central column. Lower side lobes are rather flat and extend to the outer apex. Anther wings are narrow and protrude.

Coronal scale side view enlarged about 16X. Inner lobe raised, dorsal almost horizontal cupped a little with a domed ridge down the center; anther wings fairly deeply curved.

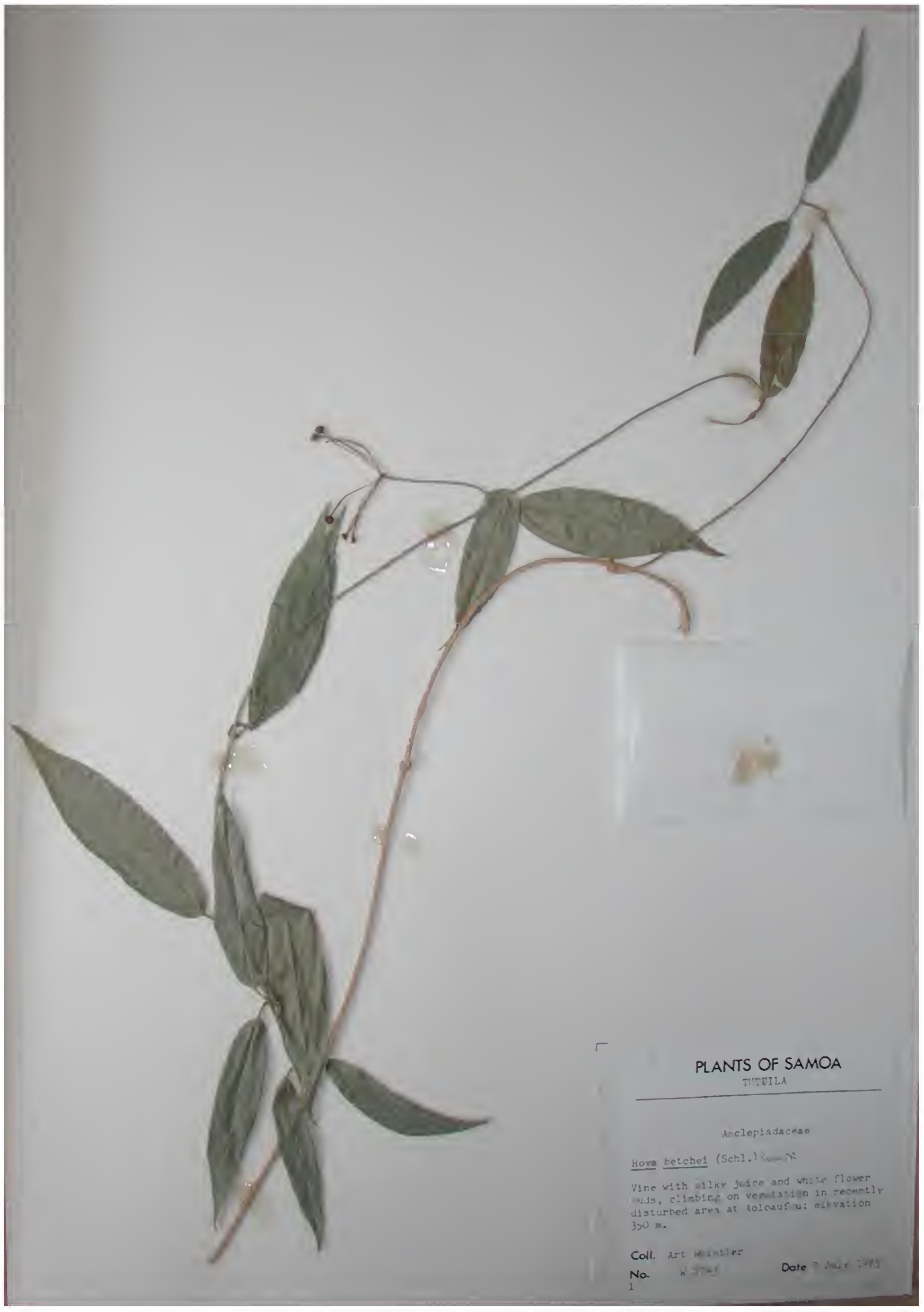
Top view of the corona showing the Stylar crown enlarged about 6X. Crown in a mealy dome.

Pollinarium enlarged about 165X.

The retinaculum is skewed a little so there is thee normal flat on view below. In this photo the dome shaped caudicle bulb is plainly visible at the base end of the pollinium, supported by the translator arm. In this view it is evident that the shoulders of the retinaculum curve backward (Right side). The pollinium is a little distorted on the lower right side.

Pollinium		
	length	0.65 mm
	widest	0. 23 mm
Retinaculum		
	length	0.25 mm
	shoulders	0.18 mm
	waist	0.08 mm
	hip	0.14 mm
	extensions	0.08 mm
Translators		
	length	0.15 mm
	depth	0.03 mm
Caudicle bulb diam.		0.08 mm

Same enlargement as above.


PLANTS OF SAMOA
TUTUILA
Asclepiadaceae
Hova hetchei (Schl.)
Vine with silky juice and white flower
buds, climbing on vegetation in recently
disturbed area at Aoloaufou; elevation
390 m.
Coll. Art
No.
Date
1

Photomicrographs of the above herbarium sheet W 2793: Bud only.

Pedicel, calyx and ovaries enlarged about 8X.

Pedicel is glabrous, terete, filiform, 1.7 cm long, 0.06 cm in diameter. The first bloom.

Calyx glabrous, Apex - base 0.20 cm long, widest 0.10 cm

Ovaries short domed, glabrous.

Description of the above herbarium sheet W 2793:

Hoya betchei (Schltr.) Whistler. 7 July 1975 Tutuila , Samoa. Vine with milky juice and white flower buds climbing on vegetation in recently disturbed area at Aoloaufou; elevation 350 m. 1 branched stem 6 pairs of leaves and single. Leaves Salix-like, elliptic attenuate, dry state green 5.5 - 8.3 cm long x 1 - 2 cm widest near the middle, glabrous, margins turn under a little, texture thin, nervation obscure, a little visible on the bottom surface, pinnate anastomosing, apex acute, base rounded. Petiole glabrous fine grooved above, 0.5 - 0.7 cm long. Internodes 6.5 - 100 cm long, terete, glabrous, buff colored ca. 0.12 cm in diameter, nodes a little enlarged. Peduncles 3.3 cm long, terete, glabrous, fine, 1/2 the diameter of the stem, first bloom. Pedicels filiform, terete, glabrous, 2.3 cm long. Only flower buds.

Note: not H. betchei, elevation too low, pedicels and peduncles too short. No determination.


Herbarium of the University of Hawaii Honolulu
Flora of Samoa
betchei (Schl.)
var. tutuilensis (Chr.)
Art Whistler
Date: Feb.1975
PLANTS OF THE HAWAIIAN ISLANDS
Samoan
Tutuila
Trail from road to summit of Matafao Peak, pendant from tree branches, stem 30-40 ft. long; flrs. purplish.
Coll C R Long
No 3045

Description of the above herbarium sheet 3045:

collected by C. R. Long, Determined by Dr. Art Whistler as *Hoya betchei* (Schltr.) Whistler 6 June 1965. Trail from road to summit at Matafoo Peak, pendant from tree branches, stems 30 - 40 feet long, flowers purplish. Elevation 1200'. 1 long looping stem ca, 35 leaves, thin, deep green, stem buff color. Leaves elliptic attenuate, apex narrowly rounded, base obtuse 8 - 9 cm long x 2.4 - 3.5 cm widest near the middle, nerves pinnate very fine netted, looping and rebranched, not clearly distinct. Petiole 1.2 - 1.8 cm long, fine 0.1 cm in diameter, same light color as the stems. Internodes 8 - 10.5 cm long, terete, glabrous, nodes very slightly enlarged, 2 stems no peduncles or flowers.

No flowers on sheet so no determination.

Description of herbarium sheet below W 3110:

Hoya betchei Schltr. *var. tutuilensis*. 13 Aug. 1975, Tutuila, Samoa. Vine with milky sap and maroon flowers, climbing in trees on the ridge between Aua & Afone; elevation 250 m. 2stems twining together, 10 leaves outspread pointing apically and one large globose cluster of flowers. 20 flowers, 24 pedicels. Envelop with 1 flower and one leaf. Leaves glabrous, thin, slate green, elliptic attenuate, apex acute to subacute, base narrowly rounded, 5.5 - 8.5 cm long, mostly 8.5 cm x 2.3 - 2.4 wide near the middle, nervation most prominent below, midrib extended below, pinnate with a pair of basal nerves anastomosing netted. Petiole fine 0.5 - 0.7 cm long, grooved above, glabrous, 1/2 the diameter of the stem. Internodes glabrous, 4 - 7 cm long, ca. 0.1 cm in diameter, nodes barely enlarged, Peduncle glabrous, terete, a little darker color then the stem, 3 cm long, 1/2 the diameter of the stem, 2nd blooming, rachis 0.2 cm long. Pedicels 2.9 cm long, terete, glabrous, filiform, dark like the peduncle. Calyx small. Corolla campanulate, cut about 1/2 way, outside glabrous, inside pubescent, heaviest around the margins. Corona glabrous, long elliptic, outer apex almost to the sinus and rounded, inner apex raised, dorsal concave.

Note: not tutuilensis coronal lobes here 0.43 cm long vs. 0.25, also chlorantha is a flat flower not campanulate, peduncles and pedicels are too short. The lobes of the corona are not shaped like H. betchei and the inner lobe is spatulate and dorsal is keeled, pollinarium way too large.


PLANTS OF SAMOA
TUTUILA
Asclepiadaceae
Hova betchei (Schl.)
var. tutuilensis (Rech.)
Vine with milky sap and maroon flowers, climbing in trees on the ridge between Aua and Afono; elevation 250 m.
Coll.
No. 3110
Date 13 Aug. 1975

Photomicrographs of flower from herbarium sheet W 3110:

Pedicel attached to the corolla enlarged about 8X.

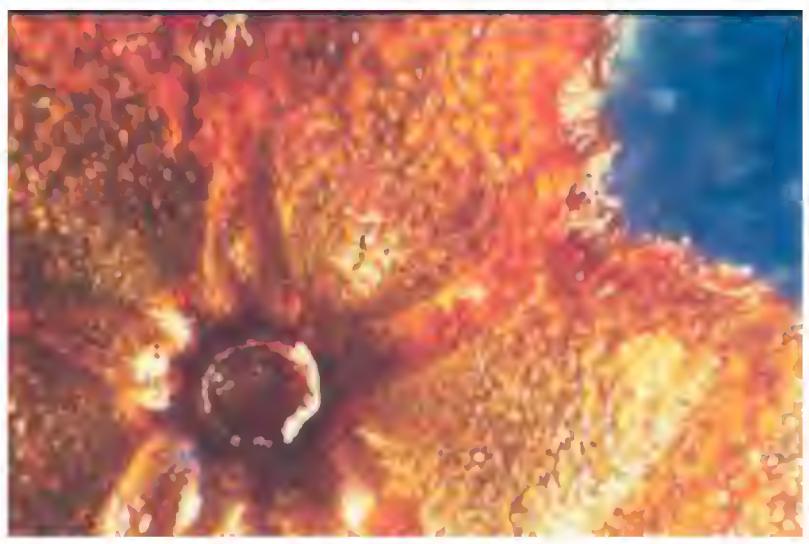
Pedicel 2.8 cm long, very fine, filiform, yellow 2nd bloom, terete, 0.06 cm in diameter

Calyx lobes do not reach the corolla sinuses.

Corolla surface glabrous.

Top view of the calyx enlarged about 8X. Sepals are ciliate, apex rounded, extending 1/3 or less to the corolla sinuses, both surfaces glabrous 0.18 cm long x 0.12 cm at the widest, apex - center 0.26 cm, membranous. I did not find any ligules.

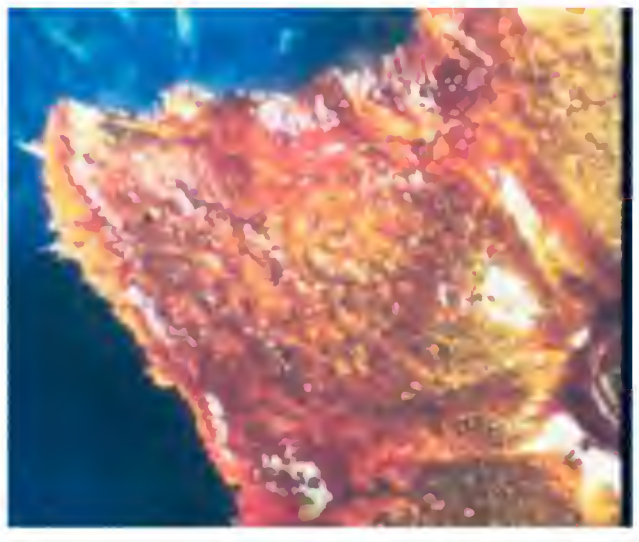
Ovaries short domed 0.13 cm tall and base pair 0.10 cm wide, glabrous.



Outside view of the corolla enlarged about 8X. Surface is finely granulose, glabrous, at the sinus area lobes are a little conduplicate eared. Central collar is thickened and indented a little, opening round.

Sinus - sinus	0.60 cm
Sinus - center	0.60 cm
Sinus - apex	0.75 cm
Apex - center	1.10 cm
Widest	0.65 cm

Flower flattened is 1.20 cm in diameter.



Outside corolla surface at the lobe area enlarged about 8X. Apex is acute, tube cut about 1/2 way. Center sunken around the collar which is much thickened and deep red-black. Coronal lobes show through from the other side as narrow linear projections from the central area.

Inside view of the flower enlarged about 8X. Corolla inside is pubescent diminishing to puberulent under the coronal area. Coronal lobes are narrow, inner lobe is spatulate, raised to a domed center, dorsal is concave with a rounded longitudinal ridge down the center, edges sharp. Outer apex narrowly rounded emarginate, because of the lower side lobes, does not reach the corolla sinus.

Bottom view of the corona enlarged about 8X. Lobes are centrally channeled all the way to the central short column. Lower side lobes that form the sides of the groove are diagonally sulcate, narrow toward outer apex to leave a whole in the groove inside from outer apex.

Apex - apex	0.43 cm
Widest	0.16 cm

Side view of a coronal scale enlarged about 16X. Anther wings are deeply scythe shaped and the edges thickened; lower shelf begins at the anther wings and extends 3/4 the way out then up and to the apex.

Top view of the corona with one scale removed to expose the central stylar crown that is a mealy headed small dome. Here the inner spatulate ends can be seen and the thick walls of the anther wings, that have opened. The dorsal central ridge is also visible

Anther wing - aw.	0.15 cm
Anther wing - center	0.15 cm
Retinaculum - ret.	0.09 cm

Pollinarium enlarged about 165X. Object distorted with one pollinium missing.

Pollinium

length	0.65 mm
Widest	0.23 mm

Retinaculum

length	0.21 mm
shoulder	0.18 mm
waist	0.08 mm
hip	0.12 mm
extensions	0.07 mm

Translator

length	0.14 mm
depth	0.03 mm

Caudicle bulb

diameter	0.05 mm


PLANTS OF SAMOA
TUTUILA
Asclepiadaceae
Hoya betchei (Schl.)
Vine with milky sap and white flowers,
climbing in trees on a ridge be
Afono and Aua; elevation
Coll.
No.
1
Date

Picture form slide taken by Dr. Art Whistler W 3111

Photomicrographs of a flower from the herbarium sheet W 3111.

Corolla outside enlarged about 8X, Color depends upon the background and light source. The surface is glabrous and finely granulose. Center dark due to the underlying corona showing through. Center is raised from a sunken area, opening is 0.15 cm x 0.09 cm edges are thickened and rounded.

Corona outside at the sinus and lobe enlarged about 8X. Slightly eared at the sinus area, apex acute.

Sinus - sinus	0.45 cm
Sinus - center	0.50 cm
Sinus - apex	0.68 cm
Apex - center	1.05 cm
Widest	0.47 cm

Flower flattened is 1.10 cm in diameter.

View of inside of flower enlarged about 8X. Corona surface is shaggy pubescent and glabrous internally or very lightly puberulent. Coronal lobes raised in the center and spatulate, touching at center, Dorsal cupped with central slight raised center; outer apex rounded and does not reach the corolla sinus.

Corona top view enlarged about 8X.

Apex - apex	0.45 cm
Widest	0.15 cm
Anther wing - aw.	0.20 cm
Aw. - center	0.20 cm
Retinaculum - ret.	0.10 cm
Ret. - center	0.10 cm

Anther wings thick and protrude a little.

Bottom view of the corona enlarged about 8X. Surface is channeled all the way to the short central thickened column.

Side view of a coronal scale enlarged about 16X. Surfaces are sulcate, inner apex raised but anthers exposed in the center, dorsal surface is concave. The anther wings thick, not too deeply scythe shaped, lower side lobes extends to the apex.

Retinaculum and attached translator arm on left side enlarged about 165X. Measurements below.

Pollinarium enlarged about 165X. End of pollinia truncate, base rounded, pellucid edge from outer apex to near base.

Pollinium

length	0.66 mm
widest	0.28 mm

Retinaculum

length	0.20 mm
shoulders	0.19 mm
waist	0.07 mm
hip	0.13 mm
extensions	0.03 mm

Translators

length	0.12 mm
depth	0.02 mm

Caudicle bulb

diameter	0.10 mm

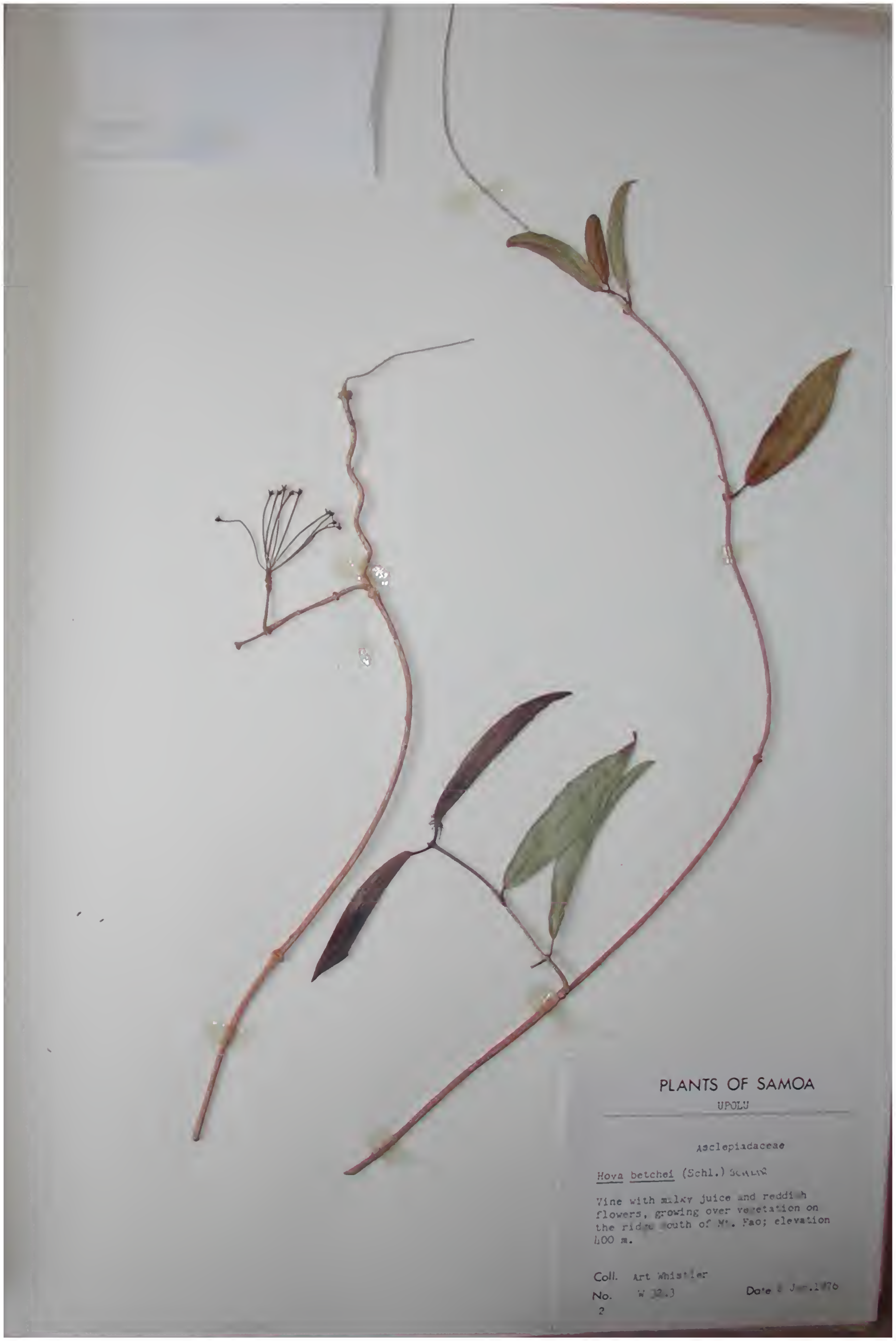
Caudicle bulb clear, flattened into a saucer by the end of the pollinium. On the right arm it is small, some may have been pulled away with the missing pollinium.

Description of the above herbarium sheet W 3111:

Hoya betchei (Schltr.) Whistler. 13 Aug. 1975 Tutuila, Samoa. Vine with milky sap and white flowers, climbing in trees on a ridge between Afono and Aua; elevation 250 m. 1 stem with 1 leaf & flower cluster with 11 pedicels 8 flowers, one stem with 3 pairs of leaves, Envelope with 3 flowers. Leaves slate green, glabrous, elliptic-attenuate 9.5 - 11 cm long x 2.5 - 32. cm widest, texture thin, nerves prominent on lower surface, less on top; midrib protruding below. Nerves pinnate anastomosing not netted. Petiole fine, leaves held apically, spreading 1 - 1.5 cm long, glabrous, terete, less then 1/2 the diameter of the stem. Internodes 9.5 - 10 cm long, terete, glabrous, slate green. 0.02 cm in diameter, nodes barely larger. Peduncle 5.2 cm long, filiform, terete, glabrous, first blooming. Pedicel terete, glabrous, filiform, slightly thinner then the peduncle 3.3 cm long. Calyx small less then 1.2 way to the corolla sinuses. Corolla cut about 1/2 way, broad above sinuses, glabrous outside, inside pubescent in a band around the margins,

centrally glabrous. Corona narrowly elliptic outer apex does not reach the corolla sinuses, inner lobes long, raised in the center, dorsal concave outer end keeled in center.

Note: This is H. chlorantha

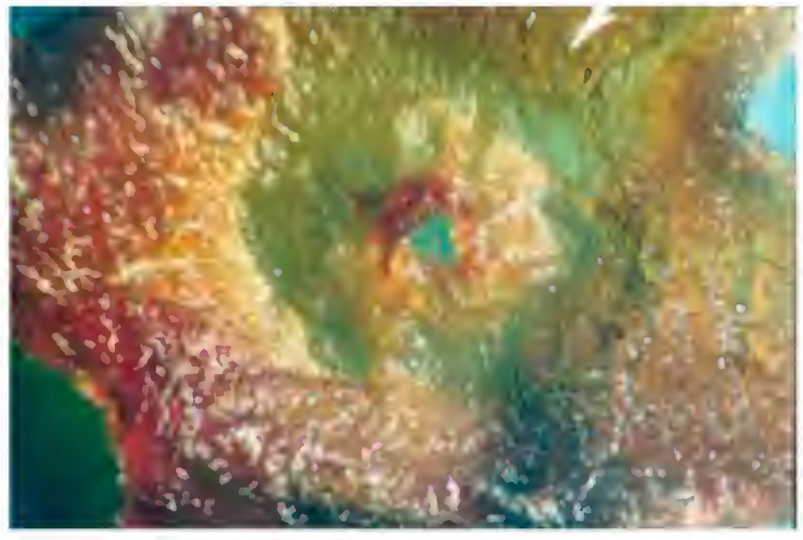

PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hova betchei (Schl.)
Vine with milky juice and reddish flowers, growing over vegetation on the ridge south of Mt. Fao; elevation 400 m.
Coll. Art Whistler
No. W 22.3
Date
2

Photomicrograph and data from herbarium sheet flower W 3243

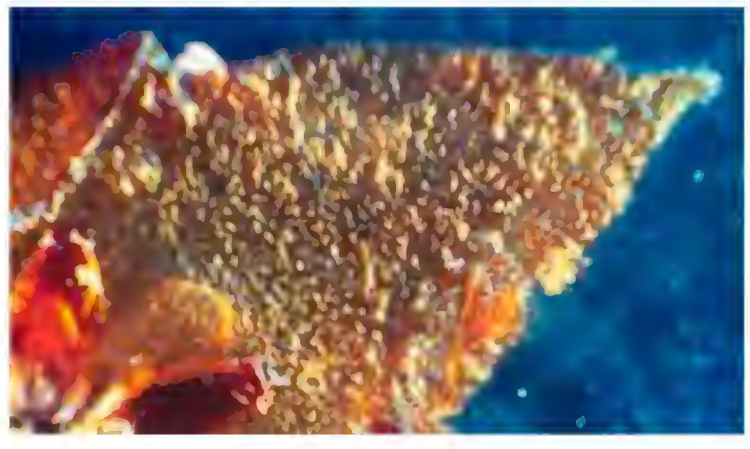
Pedicel, rachis, and calyx data from the herbarium sheet via binocular scope, no loose envelope material so not photographed.

Peduncle: glabrous, 2.5 cm long x 0.04 cm in diameter, rachis is rounded and bracteated, with third blooming here. Bracts are concave inside ciliate, small ovate with short acute apexes.

Calyx: glabrous, granulose outside and a few cilia on edges, very little basal overlap to the sepals, apex narrowly rounded. 0.13 cm long and 0.08 cm at the widest.



Corolla outside view at center enlarged about 8X. Outside granulose and glabrous. Central collar not too thickened center raised a little in a cupped area. Sinus area a little eared on the corolla lobe



Inside view of the corolla at the lobe enlarged about 8X. The inner surface is pubescent on the lobes inwardly shortening to puberulous.

Sinus - sinus	0.55 cm
Sinus - center	0.52 cm
Sinus - apex	0.65 cm
Apex - center	1.16 cm
Widest	0.60 cm

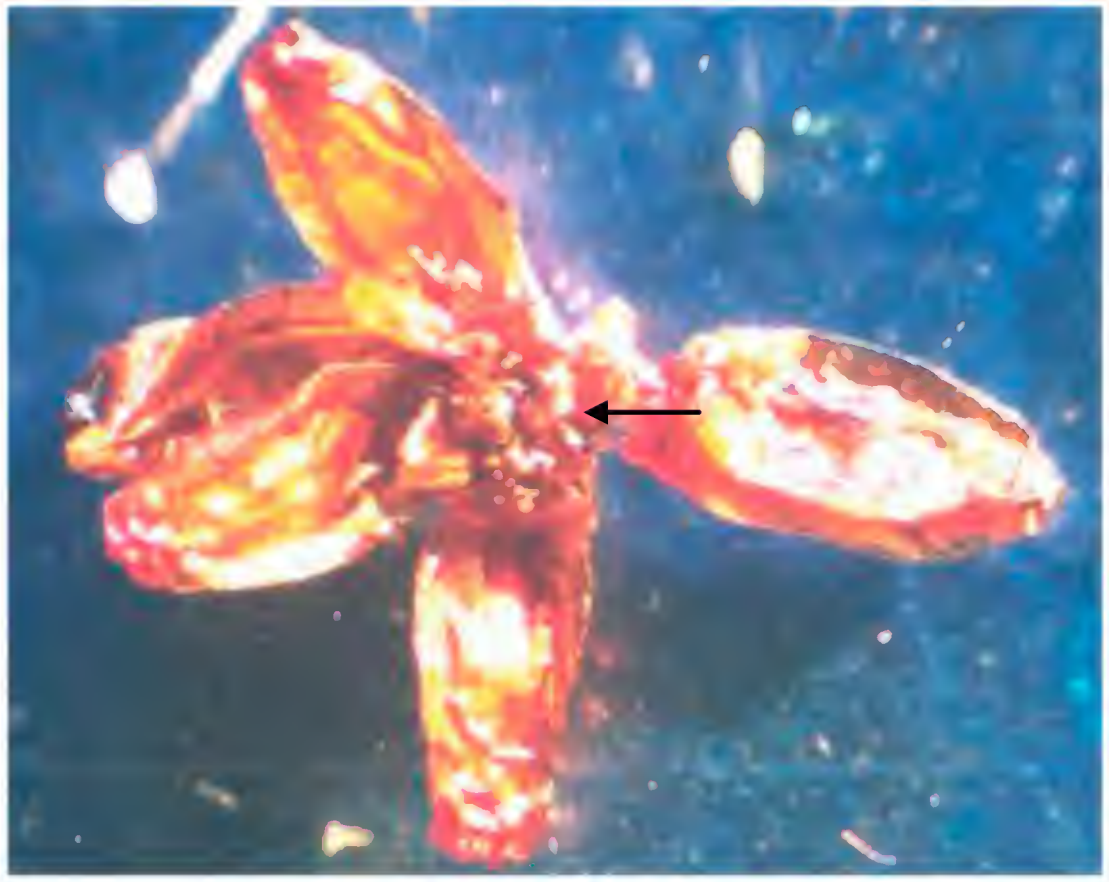
Flower flattened is 2.32 cm in diameter.

View of corona inside flower enlarged about 8X. lobes are longitudinally finely sulcate, inner lobe raised and spatulate, dorsal a little concave with an umbo near inner lobe and centrally longitudinal raised.

Apex - apex	0.35 cm
Apex - center	0.38 cm
Widest	0.15 cm

Bottom view of the corona with one scale removed enlarged about 8X., surface is channeled down the center, there is a short column, bottom shelves are narrow.

Side view of a coronal scale enlarged about 16X. Inner lobe a little raised, anther wings not deeply curved, dorsal surface nearly horizontal, outer apex rounded, blunt.



Top view of the corona with the stylar apex exposed in the center enlarged about 16X. The Samoan species all seem to have insignificant stylar apexes, here shortly domed and a little mealy.

Pollinarium above enlarged about 148X. to show the retinaculum better then the photo below.

Pollinium

length	0.54 mm
widest	0.20 mm

Retinaculum

length	0.15 mm
shoulders	0.11 mm
waist	0.07 mm
hip	0.09 mm
extensions	0.04 mm

Caudicle bulb

diameter 0.05 mm

Description of Herbarium sheet W 3243:

Hoya betchei (Schltr.) Whistler 2 Jan. 1976, Upolu, Samoa. Vine with milky juice and reddish flowers, growing over vegetation on ridge south of Mt. Fao; elevation 400 m. 1 stem with flower cluster, 1 stem with 8 leaves, envelope with 2 leaves and 8 flowers. Leaves narrowly elliptic attenuate, Salyx-like, 5.5 - 6 cm long, mostly long, 1.4 cm at the widest near the middle. Petioles glabrous, very fine, darker color 0.5 cm long, grooved above. Internodes 9-12 cm long : 1 -2 cm long on new branches, 0.2 cm in diameter, terete, glabrous, nodes a little enlarged. Peduncle 1 cm long, terete, glabrous, small, rachis 0.5 cm long bracteate & base fascicled. Pedicels filiform, darker, terete, glabrous, 2.4 cm long. Calyx small. Corolla outside glabrous, cut more than half way, finely pubescent in the center lobes pubescent. Corona elliptic lobes, outer apex subacute, inner lobe raised acute, reaching the center, outer apex not reaching the corolla sinus; dorsal concave with an umbo near inner lobe.

Note: the peduncle here is very short otherwise seems to be correctly labeled.


PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hova betchei (Schl.)
Vine with milky juice, hanging from a tree on the ridge to the south of Mt. Fao; elevation 400 m. Flowers white.
Coll. Art Whistler
No. W 3245
Date 2 Jan.1970
1

Picture from slide taken by Dr. Art Whistler W 3245

Photomicrographs and data from flower, Herbarium sheet W 3245:

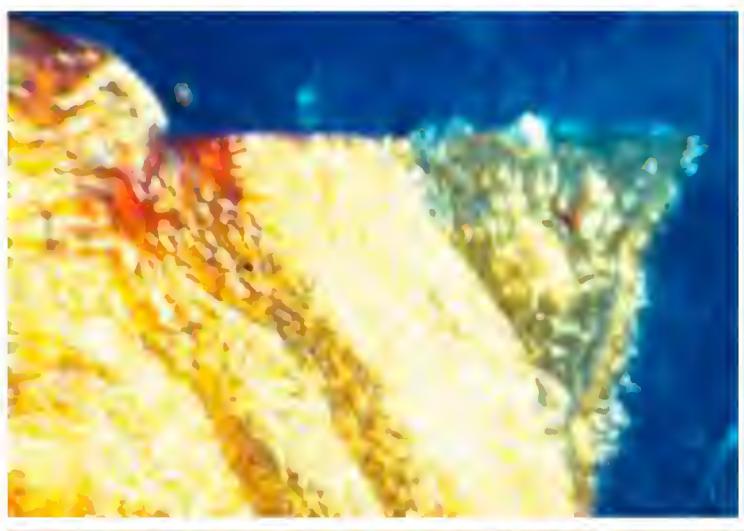
No pedicel available except attached on the sheet Data as follows.

Peduncle. 5 cm long, light colored, terete, glabrous, 0.11 cm in diameter. enlarged toward the rachis, that is bracteate, bracts cupped, edges sparsely ciliate. 2nd peduncle 6 cm long and rachis divided with circular base bracts fascicled.

Pedicles. 3.5 cm long, terete, glabrous, darker color, 0.06 cm in diameter.

Calyx. sepals apex acute overlap at the base about 1/3, 0.16 cm long and 0.15 cm wide at base, granulose outside, margins ciliate, thickened in the center.

Outside central surface of the corolla enlarged about 8X. Surface is glabrous and finely granulose, center collar is dark and thickened, opening 0.14 cm x 0.10 cm and 0.01 cm tall.



Outside surface at the lobe apex enlarged about 8X, small lobes at the sinus area.

Sinus - sinus	0.60 cm
Sinus - center	0.60 cm
Sinus - apex	0.85 cm
Apex - center	1.22 cm

Flower flattened is 2.44 cm in diameter.

Top view of the corona and corolla inside enlarged about 8X. Corona raised from a sunken area in the corolla center. Corolla edges puberulous otherwise glabrous, except for stiff hairs under the corona at the center radiation on raised ridges for a short distance. Coronal lobes do not reach the corolla sinuses. Inner lobe raised a little and spatulate, dorsal concave with a central ridge and umbo near inner lobe. 3 apexes with ends turned under.

Apex - apex	0.40 cm
Widest	0.18 cm
Anther wing - aw.	0.23 cm
Retinaculum - ret.	0.10 cm

Coronal scale side view enlarged about 16X. Inner lobe slightly raised, dorsal essentially horizontal, outer apex narrowly rounded. Most striking is the much thickened walls of the anther wings and their deep scythe shape. Surfaces are finely sulcate.

Bottom of the corona (2 scales removed) enlarged about 8X. Center is channeled but not to the column in the center. Anther wings project.

Pollinarium enlarged about 165X. Retinaculum here over the translators and one pollinium missing.

Pollinium

length	0.70 mm
widest	0.29 mm

Retinaculum

length	0.26 mm
shoulders	0.18 mm
hip	0.12 mm
waist	0.16 mm
extensions	0.06 mm ca.

Translator

length	0.10 mm
depth	0.03 mm

Caudicle bulb

diameter	0.07 mm ca.

Pollinium and retinaculum attached by the translator and caudicle but stretched downward. Both structures are attached in a diagonal hole in the side of the retinaculum.

Description of the herbarium sheet W 3245.

Hoya betchei (Schltr.) Whistler. 2 Jan 1976 Upolu, Samoa, Vine with milky juice hanging from a tree on the ridge south of Mt. Fao, elevation 400 m. Flower white. 1 stem 9 leaves 1 old peduncle; 1 stem 6 leaves 1 peduncle 6 pedicels, envelope 1 leaf and 4 flowers. Leaves thin textured, drying light brown, elliptic attenuate, apex narrowly rounded, base rounded 5.5 - 10 cm long, glabrous. Petioles darker brown from nodes a little enlarged, glabrous, grooved above mostly 0.9 cm long. Internodes 2.5 - 11.5 cm long, 0.2 cm in diameter. Peduncles one 5 cm and one 6 cm long, terete, glabrous, rachis fascicled a little enlarged. Pedicels filiform, terete, glabrous, 3.3 cm long. Calyx a little larger than previous. Corolla campanulate, outside glabrous, cut about 1/2 way. Corona glabrous, narrowly ovate outer apex rounded does not reach the corolla sinuses.

Note: probably correct except retinacula large and inner coronal lobe is spatulate, in addition the sepals are ciliate.


PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hoya betchei (Schltr.)Whistler
Vine with milky sap and whitish-yellow colored flowers, growing on a tree in a disturbed area inland from Magiagi; elevation 550 m.
Coll. Art Whistler
No. W 8443
Date 12 July 1980

Photomicrographs of a flower from the herbarium sheet W 4443:

Outside central view of the corolla enlarged about 8X. Surface is finely granulose, glabrous, collar has thickened edges is nearly circular and only slightly raised. Coronal lobes showing through the damp surface. Collar opening 0.10 cm x 0.08 cm and 0.03 cm tall.

Outside surface at the lobe enlarged about 8X. Sinus area is slightly conduplicate, apex is acute. Corolla is cut more than 1/2 way.

Sinus - sinus	0.55 cm
Sinus - center	0.50 cm
Sinus - apex	0.70 cm
Apex - center	1.00 cm
Widest	0.65 cm

Flower flattened is 2.00 cm in diameter.

Inside surface of the flower enlarged about 8X, it is pubescent decreasing toward the center. Apex of the corolla lobes do not reach the sinus.

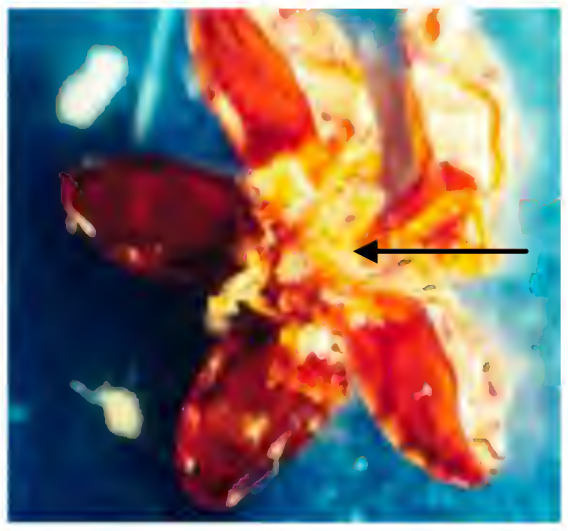
Top view of the corona enlarged about 8X. Center is raised with inner lobes spatulate. Outer lobes also a little raised with apex rounded, dorsal with median ridge a small umbo near the inner lobe, surface concave edges rounded a little.

Apex - apex	0.35 cm
Apex - center	0.40 cm
Widest	0.18 cm
Anther wing - aw.	0.20 cm
Aw. - center	0.20 cm
Retinaculum - ret.	0.09 cm
Ret. - center	0.07 cm

Bottom view of the corona enlarged about 8X. Lobes are centrally channeled to the central column and open a little near the outer apex. Anther wings are thin and protrude a little.

Inside view of the corolla with the corona removed enlarged about 8X. note the decrease in pubescent hair length toward the center, Collar slightly thickened, raised a little from a central concavity also pigmented red.

Side view of the coronal scale enlarged about 16X. The scale is relatively short, sway backed with inner lobe sharply raised, anther overtopping. Anther wings ate thin but deeply scythe shaped, bottom side lobes do not extend to the outer apex.



View of the stylar crown enlarged about 8X. Again as with most Samoan hoya species the center is raised a little, mealy and not much differentiated.

Pollinarium enlarged about 165X. I could not get the whole structure together.

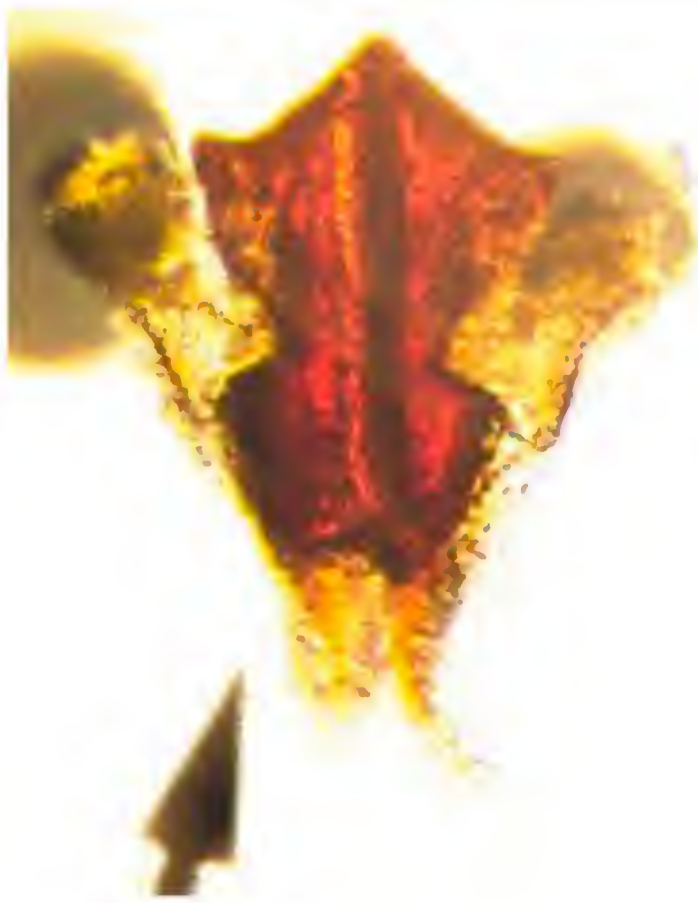
Pollinium

length	0.60 mm
widest	0.25 mm

Retinaculum

length	0.29 mm
shoulders	0.20 mm
waist	0.09 mm
hip	0.15 mm
extensions	0.07 mm

extensions are undifferentiated.



Use the dark arrow as a reference for size. The head is 0.1 mm long, base 0.05 mm wide and stem is 0.02 mm wide. Species with retinacula this long are *H. imperialis, H. thompsonii, & H. cinnamomifolia*; they are in the upper range of sizes. The length is from the top of the head to the crotch where the extensions begin.

Description of a the herbarium sheet W 5165:

H. betchei (Schltr.) Whistler. 22 Aug. 1982. Vine with yellowish-white flowers and milky sap, common in Metrosideros forest at the rim of Matavanu Crater; elevation 580 m. Savai'i, Samoa. 3 stems 2 intertwined, 5 leaves, 2 peduncles, one with pedicels & 2 flowers, 1 with a pedicel & juvenile pod. Envelope with 4 flowers. Leaves elliptic attenuate, apex acute, base narrowly rounded, glabrous, 4 - 6 cm long x 1.5 cm at the

widest, nervation fairly distinct on the thin blades, 2 basal nerves extending less then 1/2 way up, otherwise pinnate netted, anastomosing, more visible above, midrib a little extended below, edges rolled narrowly under. Petiole ca. 0.7 cm long, fine groove above, dark basal gland. Internodes 8-10 cm long. glabrous, terete, fine 0.1 cm in diameter, nodes barely enlarged. Peduncle 2.7 cm long on cluster 3 cm long on pod, glabrous, terete, slightly smaller in diameter than the stem (one small developing peduncle 1.5 cm long. Pedicels darker color, terete, glabrous, filiform 2 - 2.5 cm long. Calyx a little larger then others in group, sepals pointing apically. Corolla large, looks glabrous on both surfaces to the naked eye, deeply cut 3/4 the way in. Corona small & raised, lobes narrowly elliptic, outer apex raised, inner short, dorsal concave, lobes not reaching the corolla sinuses, glabrous.


PLANTS OF SAMOA
SAVAI'I
Asclepiadaceae
Hoya betchei (Schltr.)Schltr.
Vine with yellowish-white flowers and milky sap, common in the Metrosideros forest at the rim of Matavanu Crater; elevation 580 m.
Coll. Art Whistler
No. W 5165
Date 29 Sep. 1982

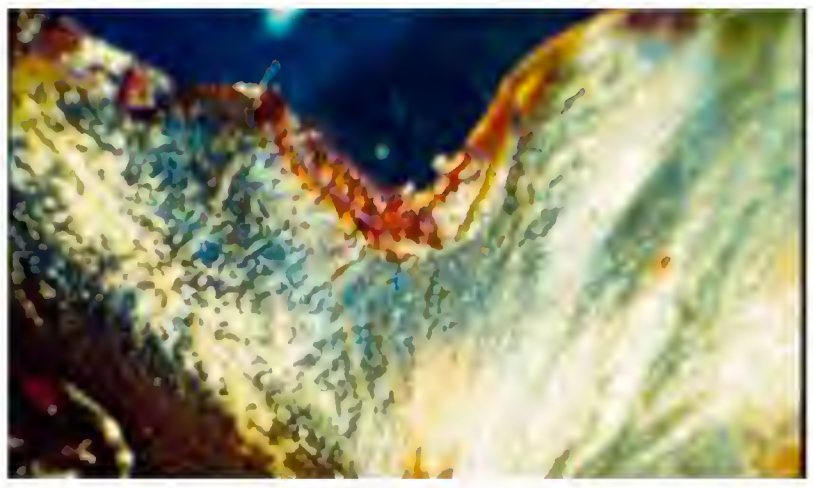
Photomicrographs and data from a flower from herbarium sheet 5165:

Center of the corolla outside enlarged about 8X. This surface is finely granulose and glabrous, central collar is red colored and a little thickened 0.12 cm x 0.08 cm at the opening. Slightly eared on lobes at the sinus area (conduplicate).

Outside surface at the corolla lobe, apex turned under.

Sinus - sinus	0.67 cm
Sinus - center	0.56 cm
Sinus - apex	0.86 cm
Apex - center	1.30 cm
Widest	0.70 cm

Flower flattened is 2.60 cm in diameter.



Outside surface of the corolla at the sinus, enlarged about 8X. Corolla lobe edges turn under (reflexed) at the sinus and are reddened, fine pubescence of the upper lobe is exposed.

Top view of the corona enlarged about 8X. it is relatively small. Inner and outer lobes raised. Inner lobe does not quite reach the center is spatulate. Dorsal is concave with rather sharp edges, outer apex narrowly rounded. Corolla margin is puberulous otherwise glabrous.

Top view of the corolla and corona at the sinus area. The puberulose margin on the coronal lobe is visible. Outer apex of corona does not reach the corolla sinus.

Apex - apex	0.215 cm
Apex - center	0.38 cm
Widest	0.17 cm

Top view of the separated corona enlarged about 8X. Center is dome shaped, note here the small umbo (yellow) just out from the inner lobe on the dorsal surface.

Corona bottom view enlarged about 8X, the lobes are channeled to the central column, anther wings are narrow and protrude.

Side view of a coronal lobe enlarged about 16X. Inner lobe is raised and exceeded by the anther, dorsal inside concave a little and sway backed. Anther wings are thin and not too curved. Lower side lobes extend to the outer rounded apex.

Pollinarium enlarged about 165X.The retinaculum in skewed up over the ends of the pollinia so the translators are not visible in their entirety.

Pollinia		
	length	0.75 mm
	widest	0.22 mm
Retinaculum		
	length	0.30 mm
	shoulder	0.19 mm
	waist	0.08 mm
	hip	0.15 mm
Caudicle bulb		
	diameter	0.06 mm


PLANTS OF SAMOA
SAVAI'I
Asclepiadaceae
Hoya botchei (Schltr.) Whistler
Vine with cream colored flowers, common on the lava flow scrub forest at Matavanu. Elevation ca. 600 m. Sap milky.
Coll. Art Whistler
No. 6871
Date 8 Aug. 1989

Description of herbarium sheet above 6871:

Hoya betchei (Schltr.) Whistler. 8 Aug 1989. Savai'i, Samoa. Vine with cream colored flowers, common on the lava flow scrub forest at Matavanu. Elevation ca. 600 m., Sap milky. 1 stem with branches, 4 pairs of leaves, 1 flower & 2 developed open pods. (16 flowers). Leaves glabrous, leaves upright, elliptic attenuate 5 - 6.5 cm long x mostly 2 cm wide, edges definitely rolled under, apex acute, base rounded, nerves pinnate anastomosing more visible below, barely visible above. Petiole Glabrous, terete, 0.6 cm long x 0.1 cm in diameter, grooved above. Internodes glabrous, terete, 9 - 10.5 cm long, 0.2 cm in diameter and smaller, nodes barely enlarged. peduncle 2 cm long, terete, , filiform, glabrous, tan colored, first bloom. Pedicels filiform, slightly darker color, glabrous, terete, 2.5 cm long. Calyx small, linear-ovate, ca. 1/2 way to the sinus, glabrous ? Corolla campanulate, cut about half way, glabrous outside, inside pubescent at the margins, diminishing inward. Corona lobes elliptic, glabrous, inner lobe narrow, raised, outer apex rounded, dorsal concave, outer apex does not reach the corolla sinus 13 pedicels. Pod at base ca. 16 pedicels & 2 enlarged and lengthened pedicels with open empty pods 12 cm long, striated longitudinally, rough outside, shiny glabrous inside, pedicels 3.5 cm long, 4 X normal diameter.

Description of herbarium sheet below 7020:

Hoya betchei (Schltr.) Whistler. 28 Nov. 1989, Upolu, Samoa. Vine with yellowish-green flowers and milky sap growing on a tree in the crater of Mt. Siga'ele. Elevation ca. 750 m. 1 stem branched, 12 leaves, 1 peduncle with 1 pedicel a second peduncle with 3 flowers + 1 pedicel from long rachis. Leaves elliptic attenuate to broadly elliptic, 3.5 - 5.8 cm long x 1.2 - 2 cm widest near the middle or above, texture medium with rough surface and margins irregular, rough, surface nerves obsolete, midrib narrow protruding below, pinnate nervation anastomosing. Petiole 0.6 0 0.8 cm long a little thick, glabrous, grooved above. Internodes 2.7 - 6 cm long., terete, glabrous, 0.2 cm in diameter, nodes a little enlarged. Peduncles 2.5cm long, terete, glabrous, rachis round, larger at the base tapering to the pedicels, small round fascicles 1.0 cm long, glabrous, but rough. Pedicels terete, glabrous, filiform 2.8 cm long. Calyx small, lobes far from reaching the corolla sinuses. Corolla outside glabrous, campanulate, not cut deeply. Outside light colored, the inside with margins pubescent. Diameter flattened 2.40 cm


PLANTS OF SAMOA
UPOLU
Asclepiadaceae
Hoya betchei (Schltr.) Schltr.
Vine with yellow-green flowers and milky sap, growing on a tree in the crater of Mt.Siga'ele. Elevation cal 750 m.
Coll. Art Whistler
No. 7020
2
Date 28 Nov. 1989

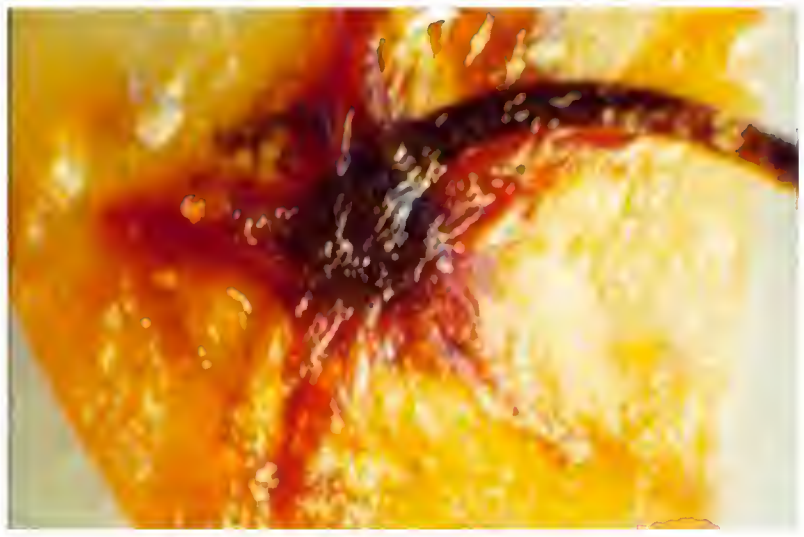
Picture from slide taken by Dr. Art Whistler 7020:

Description of herbarium sheet below 8232:

Hoya vitensis Turill ? 6 Sept 1991 Savai'i, Samoa. Vine with pale maroon flowers, milky sap, occasional in the lowland forest at Falealupo. Stem with long wide elliptic-ovate leaves of thin texture, drying slate green. 3 leaves 1 flower cluster. Envelope of 8 flowers and 2 pedicels. Leaves broad elliptic-ovate attenuate, glabrous, 10.3- 13.7 cm long, 4 - 4.8 cm widest near the middle, apex acute, base rounded to narrowly cordate, obscure pinnate nervation. Petiole long, glabrous, narrow 1.1 - 1.2 cm long, lightly grooved above. Internodes 10 - 12.5 cm long, terete, glabrous, 0.2 cm in diameter, nodes enlarged, lighter color than the petioles. Peduncle larger than the petioles 5.3 cm long, terete, glabrous, 2nd flowering from bracteoids. Pedicels dark 2.8 cm long, filiform, terete, glabrous. Calyx relatively large but sepal apexes far from reaching the corolla sinuses. Corolla campanulate, cut less than half way, outside glabrous, inside puberulous except in the central sunken area which contains the corona. Corona glabrous, lobes elliptic, outer apex obtuse, inner lobes long, dorsal with a small umbo near the inner lobe base.


PLANTS OF POLYNESIA
SAMOA
Asclepiadaceae
Hoya vitiensis Turr.?
Vine with pale maroon flowers, milky sap, occasional in the lowland forest at Falealupo.
Coll Art Whistler
No. 8232
Date 6 Sept. 1971

Photomicrographs and data from a flower from this herbarium sheet:



Outside view of the flower enlarged about 8X. The pedicel is dark colored, curved, 2.8 cm long, glabrous and 0.06 cm in diameter.

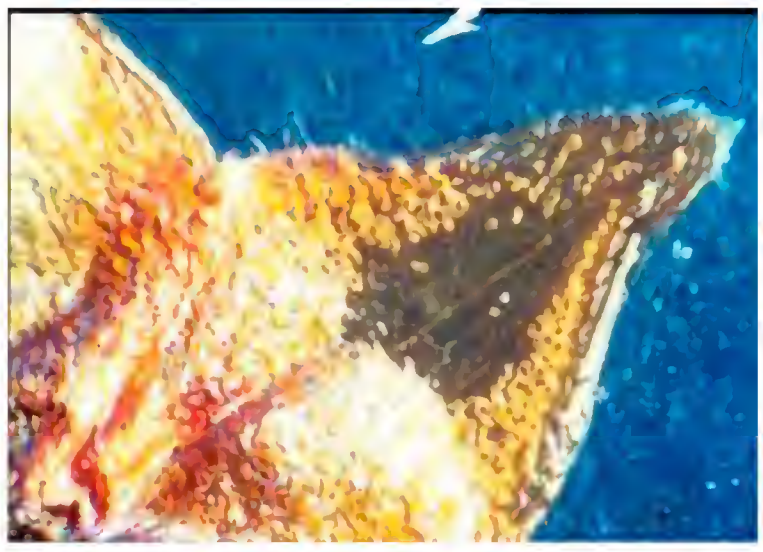
The calyx is also dark colored, linear, ciliate, apex narrowly rounded. 1 ligule present.

Apex - center	0.28 cm
Aped - base	0.20 cm
Widest	0.15 cm

Calyx outside view after removal from the corolla enlarged about 8X.

Inside view of the calyx and ovaries enlarged about 8X. The ovaries are also dark colors, short domed 0.10 cm tall and the base pair are 0.14 cm wide, glabrous.

Corolla outside center with the calyx removed enlarged about 8X. This surface is finely granulose and glabrous. Center collar is nearly round, with thickened edges, opening 0.10 cm in diameter

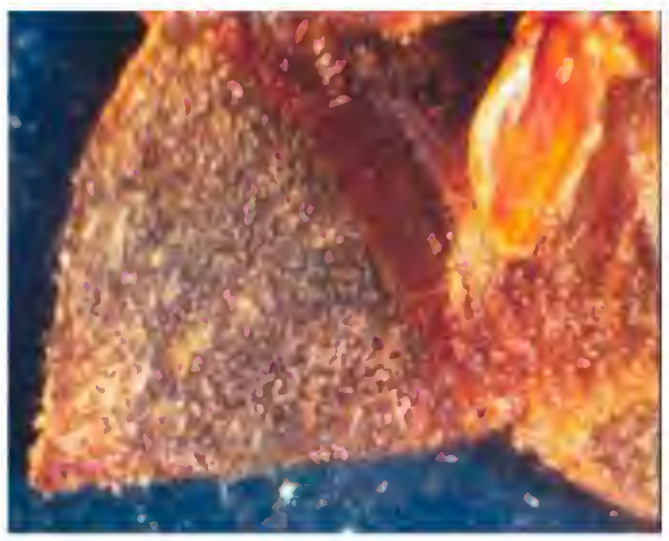


Outside view of the corolla at the lobe enlarged about 8X. Apex is acute

Sinus - sinus	0.67 cm
Sinus - center	0.67 cm
Sinus - apex	0.70 cm
Apex - center	1.20 cm
Widest	0.73 cm

Flower flattened is 2.40 cm in diameter.

Inside view of the flower enlarged about 8X. Coronal lobes are raised in the center, inner lobe is spatulate, dorsal concave with a small umbo near the inner lobe base, outer apex rounded.



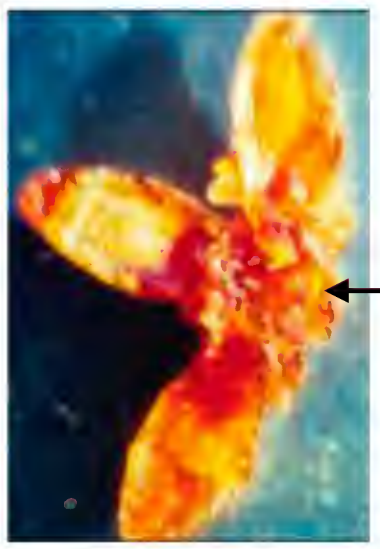
Inside view of the flower at the lobe enlarged about 8X. Inside surface is pubescent.

Top view of the corona enlarged about 8X. Inner lobes touch in the center.

Apex -apex	0.43 cm
Widest	0.15 cm
Anther wing - aw.	0.15 cm
Aw. - center	0.15 cm

Side view of a coronal scale enlarged about 16X. Dorsal is concave almost horizontal, inner lobe raised, outer rounded. Anther wing scythe shaped.

Bottom view of the corona enlarged about 8X. Lobes are channeled down the center almost to the central column. Lower side shelf reaches the apex.



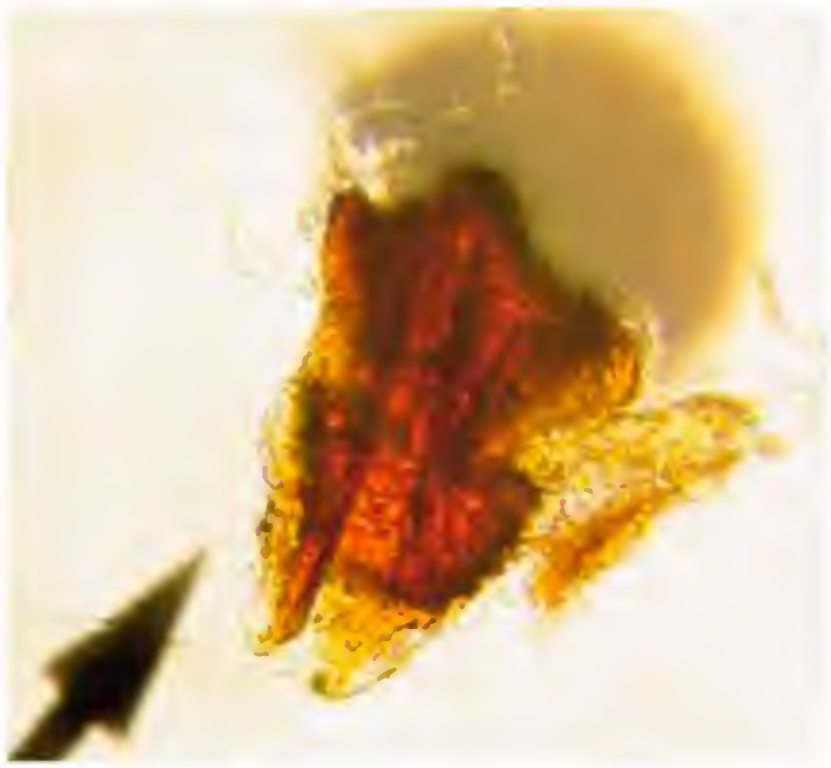
Top of corona with the stylar crown exposed enlarged about 8X. Nothing unusual here a simple domed center.

Pollinarium enlarged about 165 X.

Pollinium		
	length	0.65 mm
	widest	0.25 mm
Retinaculum		
	length	0.24 mm
	shoulders	0.18 mm
	waist	0.10 mm
	hip	0.15 mm
	extensions	0.05 mm
Translator		
	length	0.15 mm
	depth	0.02+ mm

Pollinium enlarged about 165X. Here the pollinium is not compressed as above and just slightly longer. 0.68 mm long and 0.26 mm at the widest. Many of the herbarium specimens from Samoa have pollinium which have germinated in place. Here the pollen tubes are emerging and tangled on the left side along the pellucid border.

The caudicle bulb is very faint but like a thickened Y the apex supporting the pollinia end.



Retinaculum again enlarged about 165X, to better show the translator arm (right side). and the small clear caudicle at its apex. Some pollen tubes in the background at upper left.


PLANTS OF POLYNESIA
UPOLU
Asclepiadaceae
Hoya vitiensis Turr.?
Vine with milky sap and greenish red flower buds, occasional on a tree in the disturbed area on the crater just to the west of Sina'ele. Elev. 630 m.
Coll. Art Whistler
No. 8366
Date 21 Sept. 1991

Description of the above herbarium sheet 8366:

Hoya vitiensis Turill 21 Sept. 1991 Upolu, Samoa. Vine with milky sap and greenish red flower buds occasional on a tree in the disturbed area on crater just to the west of Sina'ele. Elevation 630 m. 1 stem 4 leaves, 1 peduncle with 2 pedicels & 2 flowers, 1 peduncle and pedicel with mature pod. Envelope with 1 leaf 1 pedicel 1 flower. Leaves elliptic, light buff, attenuate apex acute, base rounded 5.8 - 7.2 cm long, glabrous x 2 - 2.5 cm wide, texture rather thin, nervation obscure but pinnate anastomosing. Petiole glabrous, grooved above, thin 0.5 - 0.7 cm long. Internodes 7.4 - 8 cm long, terete, glabrous, 0.3 cm in diameter, nodes a little enlarged. Peduncle 2nd bloom, 4.1 cm long, terete, glabrous, 0.7 cm in diameter, rachis base expanded here cone shaped, bracteoides 0.3 cm long. Pedicel terete, glabrous, 3.4 cm long, filiform. Calyx small does not reach the corolla sinus. Corolla outside glabrous, campanulate cut 1/2 way. Pod from peduncle 3.4 cm long & pedicel enlarged 3.1 cm long, 1st blooming, 13 cm long, dark, tapering to a point calyx attached at base.

Description of the following herbarium sheet 8717:

Hoya vitiensis Turrell 11 June 1992. Tutuila, Samoa. Vine with milky sap and purple flowers, occasional in the forest on Siuono Ridge above Vatia village. Only one seen in flower, 235. Twining stem with 4 pairs of leaves, 2 singles, one peduncle & flower cluster. Leaves thin, glabrous, narrowly elliptic attenuate, apex finely acute, base narrowly rounded, nervation 1 pair basal extending all the way up, otherwise pinnate, finely netted all the way to the apex, 7.4 - 8.0 cm long x 2 - 2.2 cm at the widest, edges roll under (on drying ?) (one short stem of a different plant). Petiole glabrous, 1.0 - 1.2 cm long, fine light colored green, grooved above 0.1 or less in diameter about the same as peduncle. Internodes 9 - 10.5 cm long, terete, glabrous, 0.1 cm. in diameter, nodes only slightly enlarged. Peduncle 6 cm long, terete, glabrous, 1st flowering. Pedicels filiform (ca. 19 flowers, large, rotate) glabrous, terete, buff color 3.4 cm long. Calyx small, does not reach the corolla sinus, appears linear. Corolla outside glabrous, inside glabrous except pubescent fringe on the border cut 1/2 way. Corona lobes narrow elliptic, raised in the center, outer apex rounded, do not reach the sinus, dorsal concave.

Photomicrographs of a flower from the above herbarium sheet 8717:

Side view of the pedicel. calyx enlarged about 8X. Pedicel is 3/1 cm long, terete, glabrous, 0.07 cm in diameter.
Calyx sepals very sparsely ciliate, very little basal overlap, no ligules seen, 0.20 cm long and base 0.11 cm wide.

Outside center of corolla enlarged about 8X. surface is finely granulose glabrous. Collar at center raised 0.4 cm, darker and a little thickened, opening 0.10 cm

Corolla inside at the apex enlarged about 8X.

Sinus - sinus	0.65 cm
Sinus - center	0.55 cm
Sinus - apex	0.72 cm
Apex - center	1.08 cm
Widest	0.75 cm

Flower flattened is 1.16 cm in diameter.

Side view of the coronal scale enlarged about 16X. Inner lobe raised but not covering the anthers, Dorsal reasonably horizontal, lower side lobes begin at the anther wings and extend to the outer apex which is rounded and blunt. Anther wings are deeply scythe shaped.

Corona top view enlarged about 8X. Corolla inside puberulent with pubescent margins, Center of corona raised, inner apex rounded spatulate, outer apex emarginate and rounded, dorsal concave with small umbo at base of inner lobe. Anther wings a little thickened and projecting.

Apex - apex	0.35 cm
Apex - center	0.38 cm
Widest	0.15 cm
Anther wing - aw.	0.18 cm
Aw. - center	0.20 cm

Retinaculum deep seated.

Bottom view of the corona enlarged about 8X., lobes are channeled to the central column, wide side lobes meet at the lobe apexes.

Corolla inside view at the center enlarged about 8X. surface is puberulent except pubescent around the margins. Center a little raised and slightly thickened.

Pollinarium enlarged about 165X.

Pollinium		
	length	0.64 cm
	widest	0.23 cm
Retinaculum		
	length	0.22 cm
	shoulders	0.15 cm
	waist	0.06 cm
	hip	0.12 mm
	extensions	0.05 mm
Translator		
	length	0.10 cm
	depth	0.01 cm
Caudicle bulb		
	diameter	0.05 cm


FLORA OF SAMOA
UPOLU
Asclepiadaceae
Hoya vitiensis Turr.
Vine with milky sap and greenish flowers, uncommon in the montane forest on top of Malata at 530 m elevation, just to the west of Uafato.
Collector: Art Whistler
Number: 10477
Date: 31 May 1997
1

Photomicrographs and data from a flower of Herbarium sheet 10477:

Outside view left and inside view right of the calyx enlarged about 8X. Sepals are ciliate otherwise glabrous Apex - base 0.20 cm Apex - center 0.25 cm Widest 0.15 cm Ovaries are glabrous, domed 0.15 cm wide at the base.

Corolla outside at the center enlarged about 8X. Surface is finely granulose and glabrous, ovaries and calyx still attached here.

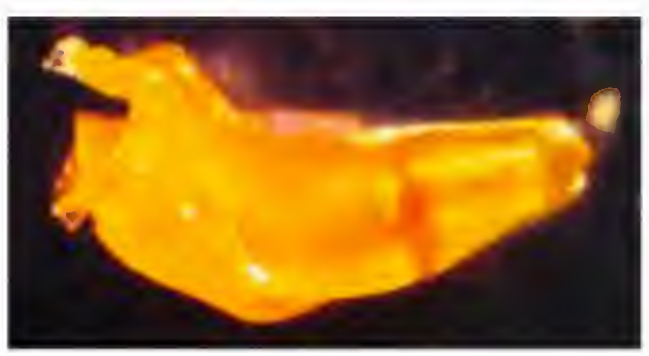
Corolla outside at the apex. eared (conduplicate at the sinuses).

Sinus - sinus	0.66 cm
Sinus - center	0.50 cm
Sinus - apex	0.80 cm
Apex - center	1.12 cm
Widest	0.75 cm

Flower flattened is 2.24 cm in diameter.

Corona top view enlarged about 8X. Inner lobes raised outer lobes tapered to a narrowly rounded end. Dorsal concave with a medium rounded ridge.

Apex - apex	0.40 cm
Apex - center	0.45 cm
Widest	0.15 cm
Anther wing - aw.	0.20 cm
Aw. - center	0.15 cm
Retinaculum - ret.	0.11 cm



Coronal scale side view enlarged about 16X. Scale relatively short and thick Anther wings deeply scythe shaped. Inner lobe raised but not exceeding the anther.

Inside view of the flower at the corolla lobe and sinus enlarged about 8X. The coronal lobe does not reach the corolla sins. Corolla inside is pubescent on the margins diminishing to puberulous inwardly. Outer coronal lobe tapers on the sides to a point note the umbo centrally on the dorsal surface.

Corolla outside at the center enlarged about 8X. Collar not much thickened Surface granulose and glabrous.

Stylar pentagonal crown enlarged about 32X, a top view The 5 corners project and turn down, in between the edges are cupped. Center is raised a little and domed. Whole surface is glabrous.

Same structure as above viewed from the side again enlarged about 32X. The stylar crown is composed of the fused styles which form a column around the ovaries at the corners (5) the anthers (not shown here) are attached an above them would be the coronal scales. On the center above the retinaculum is secreted and below it the stigmatic surface indicated by an arrow.

Pollinarium enlarged a little less then 165X. It is difficult here to get the exact measurements of the structure as indicated below.

Pollinia

length	0.67 mm
widest	0.23 mm

Retinaculum

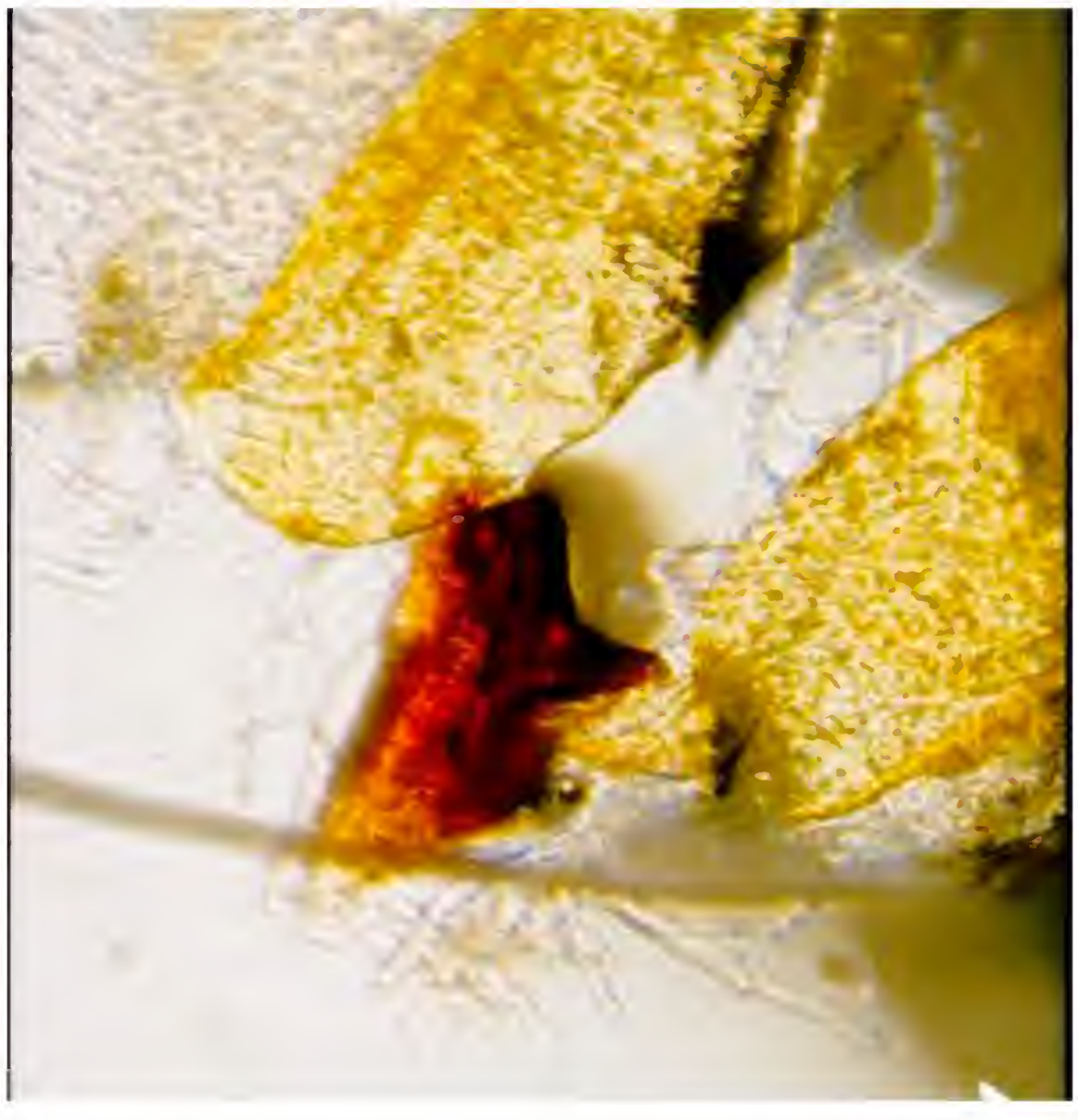
length	0.17 mm
shoulders	0.20 mm
waist	0.08 mm
hip	0.12 mm

Translator

length	0.14 mm

Caudicle bulb

diam.	0.06 mm



Note the differences in the retinaculum structure all due to focus and focal depth. Here again as with many Samoan species the shoulders curve backwards.

Another pollinarium enlarged more nearly 165X. All the pollinia in this flower had germinated and two had pollen tubes intertwined. See the mass of tubes at the lower right which lead to another pollinarium.

Description of the herbarium sheet above 10477:

Hoya vitensis Turrill, 31 May 1997 Uoplu, Samoa. Vine with milky sap and greenish flowers, uncommon in the mountain forest on top of Malata at 350 m. elevation, just to the west of Uafato. Salix like leaves, 1 stem 5 pairs of leaves 1 peduncle with 4 flowers and 8 peduncles. Envelope with 3 flowers. Leaves narrowly elliptic-lanceolate attenuate, apex sharply acute base narrowly rounded obtuse, (beautiful sheet) irregular triplinerved very finely netted anastomosing nerves, 1 pair of basal and 1 offset pair above this ca. 0.8 cm up; 8.7 - 9 cm long widest near the base 2- 2.3 cm, thin textured. Petioles long, narrow 1.1 - 1.2 cm long, probably grooved above, glabrous, green did not find a basal gland. Internodes glabrous, mostly 12 cm long 0.2 cm in diameter, light green colored, nodes slightly enlarged. Peduncle long, terete, glabrous, fine, 6.7 cm long, less than 0.1 cm in diameter from node. Pedicels (first bloom) long terete, glabrous, filiform 3 cm

long. Corolla cut 1/2 way, campanulate, large, glabrous outside; inside glabrous except with short pubescent margins. Corona narrowly ovate, outer apex narrowly rounded do not reach the corolla sinuses, dorsal concave with a rounded keel all the way; inner apex reach the center.

Calyx comparisons in cm

	Sepals length x width	to Corolla sinuses	Ligules
W 344			
W 1796	0.15 x 0.14. ciliate	less 1/4	none
W 2765	0.17 x 0.16 few cilia	less 1/2	yes (5)
W 3110	0.18 x 0.12 ciliate	1/3	none
W 3111	0.16 x 0.12 ciliate		?
W 3243	0.13 x 0.08 few cilia	less 1/4	none
W 3245	0.16 x 0.15 ciliate	more 1/4	none
W 4443	0.15 x 0.10 ciliate		
W 5165			
6871	0.17 x 0.09		not observed
7020	0.18 x 0.11		not observed
8232	linear ciliate		1 observed
8366	0.16 x 0.11 few fine cilia		not observed
8717	0.20 x 0.11 few cilia		none
10477	0.20 x 0.15 ciliate		none

Corolla Comparisons in cm

	Sinus - Center	Sinus - sinus	Sinus - apex	Widest	Apex - center
W 344	0.75	0.90	0.98	1.03	1.50
W 1796	0.67	0.75	0.75	0.80	1.15
W 2765	0.43	0.80	0.65	0.84	0.95
W 3110	0.60	0.60	0.75		1.10
W 3111	0.50	0.45	0.68	0.47	1.05
W 3243	0.52	0.55	0.65	0.60	1.16
W 3245	0.60	0.60	0.85		1.22
W 4443	0.50	0.55	0.70	0.65	1.00
W 5165	0.56	0.67	0.86	0.70	1.30
6871		0.70	0.60	0.72	0.95
7020	0.65	0.70	0.70	0.74	1.20
8232	0.67	0.67	0.70	0.73	1.20
8366	0.45	0.45	0.44	0.50	0.65
8717	0.55	0.65	0.72	0.75	1.08
10477	0.50	0.66	0.80	0.75	1.12

Corona comparisons in cm

	Apex - apex	Apex - center	Widest	Aw. - aw.	Ret. - ret.
W 344	0.48	0.48	0.15	0.22	0.15
W 1796	0.25	0.25	0.17	0.20	0.11
W 2765	0.40	0.40	0.15	0.20	0.10
W 3110	0.43	0.47	0.16	0.15	0.09
W 3111	0.45	0.45	0.15	0.20	0.10
W 3243	0.35	0.38	0.15		
W 3245	0.40	0.40	0.18	0.23	0.10
W 4443	0.35	0.40	0.18	0.20	0.09
W 5165	0.15	0.38	0.17		
6871	0.40	0.41	0.15	0.15	0.09
8366	0.27	0.29	0.09	0.20	
8232	0.43	0.43	0.15	0.15	
8717	0.35	0.38	0.15	0.15	
10477	0.40	0.45	0.20	0.15	

Vegetative comparisons in cm:

	leaves	peduncle	pedicel	Flower #/color	Elevation
W 162	6.2-8.2 x 1.7-2.3	3.0	3.8		
W 344	6.5 - 8.5 x 1.5 -2	3.0	2.8	17/cream	500m
445	5.7 - 7 x 1.5 - 2.2	3.2	1.2	20/	
W 477	5.6 - 7.5 x 1.5 - 2	2.5	3.0	14/white	
W 1796	5.6 - 9.2 x 1.7 - 2.8	8.0	4.4	8/yellow-gn.	500m
W 2765	5.3 - 5.5 x 1.5 - 2	3.0	3.0	12/ dark red	500m
W 2793	5.5 - 8.3 x 1 - 2	3.3	2.3	7/white	350m
3045	8 - 9 x 2.4- 3.5				320m
W 3110	5.5 - 8.5 x 2.2 - 2.4	3.0	2.9	24/ maroon	250m
W 3111	9.5 - 11 x 2.5 - 3.2	5.2	3.3	12/white-yel.	250m
W 3243	5.5 - 6 x 1.4	1.0	2.4	10/reddish	400m
W 3245	5.5 - 10	5.0	3.3	6-9/white	400m
W 4443	8 - 12.4 x 1.7 - 2.8	3.8	3.0	14/white-yel.	550m
W 5165	4 - 6 x 1.5	2.7	2 - 2.5	6? / white	580m
6871	5 - 6.5 x 2	2	2.5	16/cream	600m
7020	3.5 - 5.8 x 1.2 - 2	2.5	2.8	6/ y-g	750m
8232	10.3 - 13.7 x 4 - 5.8	5.3	2.8	21/pale maroon	low
8366	5.8 - 7.2 x 2 - 2.5	4.1	3.4	4/green-red	630m
8717	7.4 - 8 x 2 - 2.2	6	3.4	19/purple	235m
10477	8.7 - 9 x 2 - 2.3	6.7	3	8/greenish	530m

Pollinarium comparisons in mm

	344	1796	2765	3110	3111	3243	3245	4443	5156	8232
Pollinium										
length	0.74	0.73	0.65	0.65	0.66	0.54	0.70	0.60	0.75	0.65
widest	0.23	0.24	0.23	0.23	0.28	0.20	0.29	0.25	0.22	0.25
Retinaculum										
length	0.37	0.27	0.25	0.21	0.20	0.15	0.26	0.29	0.30	0.24
shoulder	0.26	0.18	0.18	0.18	0.19	0.11	0.18	0.20	0.19	0.18
waist	0.10	0.08	0.08	0.08	0.07	0.07	0.12	0.09	0.08	0.10
hip	0.14	0.14	0.14	0.12	0.13	0.09	0.16	0.15	0.15	0.15
extensions	0.04	0.05	0.08	0.07	0.03	0.04	0.06	0.07		0.05
Translator										
length	0.18	0.15	0.15	0.14	0.12		0.10		small	0.15
depth	0.04	0.03	0.03	0.03	0.02		0.03			0.02
Caudicle										
bulb diam.	0.10	0.03	0.08	0.05	0.10	0.07		0.06		

	8717	10447
Pollinium		
length	0.64	0.67
widest	0.23	0.23
Retinaculum		
length	0.22	0.17
shoulder	0.15	0.20
waist	0.06	0.08
hip	0.12	0.12
extensions	0.05	
Translator		
length	0.10	0.14
depth	0.01	
Caudicle		
bulb diam.	0.05	0.06

Hoya pottsii Traill

In Transactions of the Horticultural Society 7 (1830) 25. J. Traill. IV. **Hoya pottsii**. This species is a valuable addition to our gardens, for, besides having peculiar beauties, it is of easy culture and it blossoms freely. The late Mr. John Potts, on his return from China in August 1822, and shortly before his death, gave Mr. Sabine a single leaf of this Hoya, which he had gathered in one of his excursions near Macao; it was carefully planted, and anxiously attended to, until it sent forth a shoot from its base in the spring of 1824. In the autumn of the same year the plant put forth blossom-buds; these dropped off, but perfect flowers were produced in the following year.

In record of the original discovery of the plant by Mr. Potts, and as a proof of the esteem in which he was held by his employers, the species was named in the Garden of the Horticultural Society in compliment to him.

The stem is slender, greenish-brown, covered irregularly with warts, from which small roots are freely produced. The leaves are cordate, sharply, acuminate, having occasionally a rusty stairs partly spread over them, beneath of a pale whitish green without veins, above light yellowish green, with three distinct veins of ratter lighter colour than the leaf, from which smaller veins occasionally branch off. The petioles are not particularly thick, and less than half an inch long; they are of the same colour as the stems. The umbels are globose, producing very beautiful pale flowers with the same waxy appearance as *H. carnosa*, and smelling, like the Peruvian, Heliotrope, they are of a yellowish colour. The corolla is; slightly downy, and much reflexed. The crown has a pinkish centre. The figure annexed is engraved from a drawing made by Mrs. Withers, from the original plant when it first blossomed in 1825.

In The Botanical Cabinet (1833) t. 1969. Loddiges. No. 1969. **Hoya Pottsii**. Class. Pentandria. Order Trigynia. *This was introduced in 1831, from China, to the garden of the Horticultural Society, by their collector, Mr. Potts, after whom it has received its name. It has been kept constantly be the stove, and flowered in the month of May. It may be increased without difficulty by cuttings, and should be potted in rich loam.

Compiler's note: * it was introduced in 1822 not 1831. Below drawing shows nerves on the lower leaf surface (contrary to type description).

In Botanical Magazine (1835). Curtis's. t. 3425 **Hoya pottsii**. Mr. Pott's Hoya. Class and Order: Pentandria Digynia. (Nat. Ord. —Asclepiadaceae.) Specific Character and Synonyms. *Hoya* pottsii*; foliis cordato-ovatis brevi-acuminatis supra trinerviis, corolla supra vix pubescente. *Hoya Pottsii*. Traill, in Hort. Trans. v. 7., p. 25 t. 1. ? Loddiges, Bot. Cab. t.1609. (error should be 1969).

Cultivated in the stove of the Bot. Garden of Glasgow, where it flowers in May. It is much to be regretted that Mr. Traill, in his otherwise valuable paper on the different species of Hoya, has not more precisely defined the characters between his *Hoya Pottsii* and *H. trinervis*. Our plant this undoubtedly the *H. Pottsii* of the Bot. Cabinet, but the

colour of the flowers is different from that of Mr. Traill, and in this respect, as well as in some others, it agrees better with the *trinervis*, of which its author says, "It bears a Great to resemblance to *H. Pottsii*, from which, however, it may be principally distinguished by its larger and thinner leaves, the veins of which are more strongly marked, and also by the yellowish colour in the centre of the crown." May not the two be varieties of one and the same plant ? In ours, the old leaves at the base of the plant are much thicker than the upper ones, and have the nerves more obsolete. From *H. carnosa* the species is best known for its larger, broad three-nerved leaves, and the almost entire absence of down upon the upper surface of the corolla. It wholly wants the bright red spots in the inside of the crown, and the smell certainly cannot be compared to that of a "rich plumb cake, or a combination of that of honey with the almond flavour of the Peruvian Heliotrope," (to which that of *H carnosa* is likened by Sir J. E. Smith,) but rather resembles that of strong and bad honey.

If we are correct in considering the plant to be the original *H. Pottsii*, it is a native of the vicinity of Macao where a leaf was gathered by the zealous collector to the Horticultural Society, whose name it bears, and which being, given to Mr. Sabine, and planted, soon flourished. The *H. trinervis* was brought from China by Mr. John Damper Parks.

Descr. Stem long, branched, twining, the extremities frequently leafless and rooting. Leaves ovate-cordate with a short acumen; when old, very thick, and between fleshy and coriaceous, convex below, and pale-green, with scarcely an appearance of nerves; above concave, deep-green, with one central and two lateral nerves, the middle one sometimes sending out very obscure lateral oblique ones, the margin slightly revolute. Petioles rounded, short, *very thick; when old, clothed with a sort of pale-brown bark. Peduncle from the side of one of the petioles at its base, two inches long, bearing a compact almost globose umbel of flowers. Calyx with five short, broadly ovate teeth. Corolla rotate, of five broadly ovate, acute, very pale yellow-green lobes, quite glabrous below, above so slightly downy that the pubescence can only be seen by the assistance of a microscope. Crown of five large, depressed fleshy, ovate, spreading, white leaves, between which the colour is orange.

*Named in. honour of Mr. Thomas Hoy, gardener to His Grace the Duke of Northumberland.

*Type description says not particularly thick.

Compiler's notation: There is a question as to whether they even are referring to the original *H. pottsii.* I believe this ambiguity permeates this species identity and it even though being questionable, has been indiscriminately lumped with almost any species that has a palmate leaf nervation weather 3 or 5 nerved, palmate or tup-linerved and irregardless of the size of the leaf or its base and a disregard for the flower structure or number of flowers per cluster etc. etc. Description says "one central and two lateral nerves" but the drawing below shows a leaf with 7 nerves on the upper surface. (shear inconsistency).

In General System of Gardening and Botany 4 (1837) 126. G. Don. 17 **H. pottsii** (Trail, in hort. trans. 7. p. 25. t. 1.) stems slender, greenish brown, usually covered with warts; leaves cordate, acuminated, with a rusty stain partly spread over them, pale whitish below, light yellowish-green above, with 3 principal veins; umbels globose. Woody perennial shrub. Native about Macao. Flowers pale yellow, slightly downy, smelling like Heliotropium. Corona slightly purple in the Centre. Pots's Hoya. Fl. Ju. Aug. Clt. 1822. Shrub tw.

In Synopsis Plantarum 6 (1840) 892. N. F. Dietrich. 30. **H. Pottsii** Traill. fol. cordato-ovatis breve acuminatis supra 3-nerviis; cor. supra vix pubescente, Traill, in Linn. Trans. 7. t. 1. B. Cab. 1609.* B. M.. 3425. Prope Macao Woody. Cor. alba. *Error should be 1969.

Translation: foliage cordate-ovate briefly acuminate above 3 nerved; corolla above barely pubescent.

In Prodromus System Veget. 8 (1844) 638. (DeCandolle's) Decaisne. 26.**H. Pottsii** Traill hort. transact. lond. V. 7, p. 25, t. 1), volubilis glabris, caulibus ramisque teretibus, foliis ovatis v. subcordato-ovatis brevi acuminatis supra trinervis, nervis ad limbum medium evanescentibus, subtus aveniis pedunculis brevibus multifloris, pedicellis gracilibus glabris, corolla; introrsum vix pubescente pallida flava, coronae stam. Foliolis ovato-acutis albidis, apice porrecto. Woody shrub in China circa Macao. *Hoya Pottsii* Lodd. bot. cab. t. 1969; Bot. mag. t. 3425,. (v.s.v.cult. h. Mus. par.)

Translation: twining, glabrous, stalks branched round, leaves ovate or almost cordate-ovate, shortly acuminate above three nerved, nerves vanishing towards the middle, veinless beneath, peduncles short many flowered, pedicels slender glabrous, corolla inside barely pubescent pale yellow, leaflets of the staminal corona ovate-acute white, apex stretched. A woody shrub in China near Macao. *H. pottsii* Loddiges Botanical Cabinet, t. 1969; Botanical Magazine t. 3425, (I have seen it in cultivation in the herbaria of the Paris Museum.)

In Dictionary of the Royal Botanical Society. **H. Pottsii**. l. cordate, slender-pointed, rusty above, paler beneath. fl. pale yellow, slightly downy, fragrant; corona white with yellow centre; umbels globose. India 1824. (B. 3425; L.B.C. 1069.) Should be 1969. *Var. trinervis*. L. oblong, light yellowish-green, variable in size. fl. pale greenish-yellow. China.

In Tuinbouw Flora 1 (1854) 68-69. DeVriese. 5. **Hoya Pottsii** Traill. De Hoya naar Pots genoemd, is 't cerst ingevoerd geworden in Betanischen tuin van Glasgow, alwaar die plant gebloeid heeft in Mei 1833 Zij schijnt van *H. trinervis* te verschillen door de breedere en dunnere bladen, waarvan de aders sterker geteekend zijn, en door de geelwitte kleur, in het midden van de bloem heeft het kroontje eene geelwitte kleur. Een enbel bald van deze plantsoort was op Makao ingezameld door den verzameleer Pots, wiens naam de plant draagt, en 'twelk in Engeland tot den wasdom eener volkomen plant gekomen zijnde, aldaar spoedig tot bloei kwam. De gele bloemkroon met de witte bijkroontjes, wier middelpunt licht oranje-rood is, maakt deze plant tot een sieraad der kassen Atfgeb. in Hook. Bot. Mag. t. 3425.

Translation: The Hoya named for Pots, was imported first into the botanical garden of Glasgow, where those plants have thrived in May 1833, they seemed to diverge from *H. trinervis* by their being of thinner leaves, of which being stronger divided veins and by the yellow white color, in it middle of the flower having a coronet of a yellow-white color. An entirely glabrous from these plant types was from Macao imported by the collections by Pots, whose name the plant carries, and brought to England their through the wisdom one absolute plant, there early until florescence came. The yellow blooms with the white crown, with the middle part being light orange-red, making these plants an ideal house plant. From in Hooker Botanical Magazine t. 3425.

In Dictionary of Gardening, London 2 (1884). G. Nicholson. **H. Pottsii** (Potts's).* fl. pale yellow, slightly downy, fragrant; corona rather purple in the centre; umbels globose. l. cordate, acuminated, with a rusty stain partly spread over them, pale whitish beneath. India 1824. (B.M. 3425.)

In Enumeration of Plants from China, Formosa, Hainan, 2. **Hoya Pottsii**, Traill in Trans. Hort. Soc. Lond. vii p. 25, t. 1; DC. Prodr. viii. p. 638; Maxim. In Med. Biol. Ix. p. 822; Lodd. Bot. Cab. t. 1969; Bot. Mag. t. 3425.
Hoya trinervis, Traill in Trans Hort. Soc. Lond. Vii. p. 26 ?
Kwangtung: Macao (Potts ex Traill).

We have seen no specimens of this, either wild or cultivated; but the conspicuously three-nerved leaves, as represented in the figures cited, at once distinguish it from *H. carnosa*, R. Br.

In Journal of the Linnean Society 26 (1889) 116. W. B. Hemsley. 2. **Hoya Pottsii**, Traill in Trans. Hort. Soc. Lond. Vii. p. 25. t. 1.; DC. Prod. viii. p. 638; Maxim. In Med. Biol. Ix. p. 822; Lodd. Bot. Cab. t, 1969; Bot. Mag. t. 3425.,
Hoya trinervis, Traill in Trans Hort. Soc. Lond. vii. p. 26 ?
Kwangtung : Macao (Potts ex Traill).

We have seen no specimens of this, either wild or cultivated but the conspicuously three-nerved leaves, as represented in the figures cited. At once distinguish it from *H. carnosa*, R. Br.

In Kew Bulletin of Miscellaneous Information Dunn & Tutcher(1912) 173 "Flora of Kwangtung, China" Dunn & Tutcher. 2. *H. pottsii*, Traill; DC. Prod. viii. 638. Macao. Fl. pale yellow, —.

In Sunyatsenia 3 (1936) 171. Tsiang. **Hoya Pottsii** Traill in Trans. Hort. Soc. 7: 25. t. 1. 1830; G. Don, Gen. Syst. 4: 126 1838; Decne. in DC., Prodr. 8: 638. 1844; Maxim. in. Bull. Acad. Sc. St. Petersbourg 23: 384. L877; Bot. Mag. t. 3425; Hemsl. in Journ. Linn. Soc. 26: 116. 1889; K. Schumann in Engler & Prantl, Nalürl. Pflanzenfam. 4, Abt. 2: 290. 1895; Dunn & Tutcher in Kew Bull. Misc. Inf. Add. Ser. 10:172. 1912.
Hoya obscurinervia Merrill in Philip. Journ. Sc. 23: 263. 1923, in Lingnan Sc. Journ. 5: 153.1927, synon. nov.
Kwangtung: Kochow, Kuliangling, Y. Tsiang 2226 (Fruiting Type), May 10, 1929; Ling Shan, K. K. Tsoong 1835, June 8, 1908.
Hainan: Nodoa, F. A. McClure 9819 (isotype of *H. obscurinervia* in Herb. Lingnan Univ. and Hongkong Bot. Gard.), April 15, 1922; Taam Chau, W. T. Tsang 299, May 6, 1928; without precise locality, T. K. Lu 9331, July, 1933; Ngai Yuen, C. Wang 33071, July 16, 1933; Man-ning, H. Y. Liang 61501, April 5, 1932;Lingshui, H. Y. Liang 65418, April 26, 1932; Heng-pu Po, H. Y. Liang 65212, Feb. 24, 1934; Ngai Yuen, F. C. How 70373, March 17, 1933; same locality, F. C. How 70803, May 25, 1533.
Distribution: Kwangtung, new to Hainan. Descr. add. Pedunculus fructi glaber 2 cm longus; foilliculi lineari-oblongi prope apicem attenuati divaricati 11 cm longi 8 mm crassi, epicarpio cinereo nigrimaculoso purberuli, endocarpio flavido coriaceo; semina minuta lineari-oblonga 4 mm longa, 1 mm lata obtusa basi acuta, comis albo-sericeis 3.5 cm longis. This is very near the preceding, Tsiang 2226 exactly matches the plate and description in the Botanical Magazine and is the same as the isotype of Hoya obscurinervia Merr. except that in the latter, the leaf base is slightly narrower, but in this respect much variation is shown in the numbers above cited. Other collections from Hainan representing the narrow leaved form are: Ngai Yuen, H. Y. Liang 61901,.July 4, 1933; Chin Shan, Fan Maan Tsuen, F. A. McClure 20081, May 4-20, 1932; Fung Shue Shan, W. T. Tsang 299, May 6, 1928; Nga-ping Shan, Taam Chau, W. T. Tsang 957, Sept. 29, 1927.
Compiler's note: Here lumping occurs without any details. It seems plausible that there

are two species here and maybe more. The author first adds material and then states "much variation is shown in the numbers above cited" as if to prove variability.

Translation: Peduncle fruiting glabrous 2cm long, follicles linear oblong near the apex attenuate, spreading 11 cm long, 8 mm wide, thick epicarp grayish black spotted, puberulous, endocarp yellow leathery; seeds small linear oblong 4 mm long, 1 mm wide, obtuse, base acute, como white silky 3.5 cm long.

In Flora Kainantensis (1943) 267. G. Masamure. **Hoya pottsii** Traill, in Trans. Hort. Soc. Vll. p. 25, t. 1 (1830); Tsiang, in Sunyat. III p. 171 (1936); Tanaka et Odashima, in J.-Trop. X. p. 379 (1938). Syn. *Hoya obscurinervia* Merr., in Philipp. Journ. Sc. XXIII p. 263 (1923) et in Lingn.-J. V. p. 153 (1927); Groff, Ding & Groff, in Lingn.-R II p. 131 (1924); Kaneeh et Sasaki, in Tr. Nat. Hist. Soc. Formos. XIX p. 373 (1929) *Script* A. Neung Hai ..... *Script.* (this follows the 1936 description).

In Acta Phytotaxinomica 12/1 (1974) 124-125. J. Tsiang & P. T. Li. **Hoya pottsii** Trail **var. angustifolia** (Traill) Tsiang et P. T. Li, comb. nov. *H. angustifolia* Traill in Trans. Hort. Soc. 7: 29 (sp. dub.) 1830. .... *Followed by script.* The script translated by Peter Tsang (Australia) indicates that One collector collected the species in 2 different locations and another collector in 3 locations (Field collection numbers are shown. Also indicated are different color and color combinations. "The structure of the flowers the tri nerve venation of this mutation (*H. pottsii var. angustifolia*) is identical to that of the normal *H. pottsii*, but the leaf of this mutation is narrower and the shape of the base of the leaf is more cordate." (I'll bet there are other differences RDK).

In Flora Republicae Popularis Sinicae, 63 (1977) 476-479. 1..... *script.* **Hoya pottsii** Traill in Trans. Hort. Soc. Lond. 7: 25, t. 1. 1830; Decne. In DC. Prodr. 8: 638. 1844; Hemsl. in Journ. Linn. Soc. Bot. 26: 116. 1889; K. Schum. in Engl. u. Prantl, Nat. Pflanzenf. 4, 2: 290. 1895; Dunn et Tutch. in Kew Bull. Misc. Inf. a. s. 10: 172. 1912; Tsiang in Sunyatsenia 3: 171. 1936; .....script ..... *Hoya obscurinervia* Merr. in Philip. Journ. Sci. 23: 263. 1923, et in Lingnan Sci. Journ. 5: 153. 1927. *Script following... ... ...*

In Austrobaileya 3/4 (1992) 635. P. I. Forster & D. J. Liddle. 2. Typification and Synonymy of **Hoya pottsii** Traill. *Hoya pottsii* Traill, Trans. Hort. Soc. 7: 25 (1827). Type: *based on plant in cultivation. (lecto (here designated): Traill, Trans. Hort. Soc. 7: 25. fig 1 (1827)). * (from where? RDK)

Hoya nicholsoniae F. Muell., Fragm. 5: 159 (1866). [October, not specified to day], synon. nov. Type: 'In arboribus ad sinum litoreum Rockingham's Bay, Daliachy' (holo: MEL n.v.).

Hoya hellwigiana Warb. in Fedde, Repert. Spec. Nov. Reg. Veg. 3: 342 (1907). synon. nov. Type: 'Kaiser Wilhelms-Land: Bussum bei Finschhafen', O. Warburg 21313 (holo: B n. v., destroyed).

Hoya sogerensis S. Moore, J. Bot. 52: 293 (1911). synon. nov. Type: Papua New Guinea. Central Province: River side Sogere, 1885 - 6, H.O. Forbes 691 (holo: BM!).

Additional selected specimens. Celebes. Sulawesi Selatan, Soroako, S. shore of Lake Matano, de Vogel 5793 (BRI). Irian Jaya. Sorong, Roefei River N of the town, Mar

1954, van Royen 3007 (L); Mamberamo, Oct 1914, Feuilletau de 8rayn 130 (BO,L); Rouffaer River, Aug 1926, Docters v. Leeuwen 10122 (BO,L,SING; K n.v.); Waigeo Is, Lupintol Village on SW coast of Majalibit Bay, Feb 1955, van Royen 5483 (L); Mainpi, near Andai, SW of Manokwan, Nov 1961, Vink BW12104 (L). Papua New Guinea. East Sepik Province: Ramu flusz, Tappenbeck 37 (WRSL).

Distribution and habitat: Widely distributed in Celebes, New Guinea and Australia (Forster & Liddle 1990).

Notes: Since the publication of our account of *H. nicholsoniae* F. Muell. (Forster & Liddle 1990), we have been able to examine a much greater range of material, particularly from L, that is referrable to this taxon. From this it is clear that *H. nicholsoniae* F. Muell., *H. hellwigiana* Warb. and *H. sogerensis* S. Moore are all conspecific, based on the examination of type collections, original descriptions and collections from the areas where these taxa originated. However, it is evident that *H. pottsii* Traill is also conspecific with these taxa as suggested by Burton (1983) and hence, due to priority, its name is the correct one to be used for the aggregate taxon.

H. pottsii has been newly named in most geographic regions where it has been collected, and although there is wide variation in flower colour and to some extent leaf size and shape, which are both dependent on environment* (Forster & Liddle 1990), there are no valid reasons for upholding any of the later names.

The status of *H. samoensis* Seem. described from Samoa, *H. neocaledonica* Schltr. described from New Caledonia, *H. neoebudica* Guill. described from Vanuatu and *H. cominsii* Hemsley, described from Solomon Islands, with respect to *H. pottsii* is unclear at this stage. We have examined a wide range of collections from these areas (holdings at BSIP, P and NOU) and recently collected (June 1991) a range of material from Solomon Islands of *H. cominsii*; however, further comparisons with *H. pottsii* from Australia and New Guinea must wait until this recent material has been grown and flowered under similar conditions.

Typification of *H. pottsii* is critical to the application of the name and this species was named somewhat informally by Traill (1827). There appears to be no specimen at K that could be unequivocally considered as a type for *H. pottsii.* However, there is a flowering specimen at K labeled *'Hoya Pottsii* Traill. Hort Glasg. bot. Mag. t. 3425' that may possibly represent the cultivated material illustrated both by Traill and by Hooker (1835). This plant may well have persisted in cultivation at K for a considerable time as there is a further flowering collection of 2 sheets labeled [in part] *'Hoya pottsii* Trail native in China . . . EN464-63 Sir George Taylor H2855/86 . . .'. While the geographic origin of both these cultivated collections is problematic, it is unlikely that they came from China [Macao], the reputed origin for *H. pottsii* (Traill 1827; Hooker 1835), and both are conspecific with the Australian and Papuasian material. While of dubious status as types of *H. pottsii*, both specimens lend credence to our application of the name *H. pottsii* to the taxa treated as conspecific in this paper. In the absence of an unequivocal type specimen for *H. pottsii*, we have selected as lectotype, the plate published by Traill (1827) which agrees perfectly with the taxon we applied the name to.

Compilers notation: these variations may also be due to genetic makeup. In this discussion the key word is "may". It seems all this is based on speculation of nebulous identifications. Geoff Dennis told me that the species referred to above as *H. cominsii* in

fact was not that species but another yellow flowered species very common on Mt. Austin and elsewhere on Guadalcanal, also *H. pottsii* is not from Australia as stated in that sentence. When there is a question as to a type "in the absence of an unequivocal type" why would anyone select material as a lectotype represented only by a plate and say it "agrees perfectly" I doubt this and disagree with the underlying premise. There are no stem, leaf or flower cluster measurements presented. From a drawing one can not see the calyx, pollinarium, stylar table or if the petiole is grooved or not so major taxonomic details are missing.

Key characters of Hoya pottsii Trail : Most not from the poor type description.

Leaves sharply acuminate, convex below, pale green, scarcely an appearance of nerves: concave above, deep green; one central & 2 lateral nerves of lighter color. No measurements.

Petiole short - 1.5 cm

Peduncle 5 cm long.

Cluster compact, almost globose.

Calyx broad ovate.

Corolla reflexed, glabrous out; very fine puberulent in (seen only with microscope).

Corona scales ovate acute.

Palmately nerved specimens on Herbarium sheets; all in First folder:

These in the past have all been placed into Synonymy with *H. potsii.* I do not feel any of these species belong there. First none have cordate leaf bases. Only 2 have a globose flower cluster W 1297 and 9089, and these do not appear to be tight. Of those with flowers only 4 have peduncles as short as in *H. pottsii.* (W 1024, W 1237, 8505 and 9089); of these 4, 2 have very short peduncles W 1024 and 8505. Only 2, W 1506 and 8505 are trinerved and W 1506 has a peduncle almost twice as long as *Hoya potsii.* Two appear to be 5 palmately nerved, W 1024 and W 1046. W 206, W 1237, W 1297, W 1460, 1985 and 9089 are all 5 tuplinerved species.

If they are not *Hoya pottsii* what are they:

The possibilities among those described form Samoa are **Hoya pycnophylla** Reich. (1908).

Key characters:

Altitude 10 - 100 m.

0.9 - 1.0 cm in diameter.. Only *Hoya samoensis* has the inner corolla surface pubescent, and with deciduous peduncles. Hoya upoluensis has the largest foliage, the smallest peduncles and the longest pedicels. calyx is also larger. and the flowers are larger. Reinecke criticized Seemann for an inadequate type description. In my opinion none of these three descriptions are adequate. Many details are lacking and also a lot of measurements. None are as thorough as Dr. Schlechter's descriptions. I assume it is not a low elevation species.

I would conclude that W 1024, W 1046, are most likely *Hoya pycnophylla* species. I believe W 206, W 1237, W 1297 ,1460 and 1985 are *Hoya samoensis* species. I conclude that W 1506 and 8050 both triplinerved (3) are the same and a new species. 9089 stands out as being decidedly different from all the others and also a new species.

Material from the Second Herbarium Sheet Folder: Pinnately nerved leaves.

The species described from Samoa with this leaf nervation are *Hoya attenuata* Christophersen, *Hoya betchei* (Schlechter) Whistler, *Hoya chlorantha* Rechinger and *Hoya filiformis* Rechinger. (excluded are the *Hoya australis* types) 4 species. All have glabrous leaves, petioles, peduncles and pedicels.

Characters for **Hoya attenuata**.
Altitude: high 1000m.

Leaves 5-8 x 1.6 - 2.8 attenuate base obtuse, anastomosing, netted, not prominent. Petiole 0.8 - 1.1 cm long, grooved above.

Peduncle 1-2 cm or puberulose. Persistent.

Pedicel 2+ cm

Calyx Triangular obtuse, 0.1-0.15 cm, glabrous.

Corolla 1 cm creamy white, lobes 0.35 cm, out glabrous, in pubescent.

Corona 0.15 cm in acute, out obtuse.

Characters for **Hoya betchei**
Altitude: high mountains.

Leaves 6.9-9.5 x 1.8-2.3 cm lanceolate-elliptic, base rounded. Petiole 1.0 cm

Peduncle 5-6 cm

Pedicels 3.5 cm

Calyx ovate obtuse 0.2 cm

Corolla broad campanulate, out glabrous, in puberulous, ciliate, few flowers. "5 lobed c. 1.1 cm long". (These would be long lobes but if measured from the center to the apex seems most reasonable)

Corona oblong, inner lobe short, out raised, obtuse.

Pollinarium translators short, retinaculum minute.

Characters for **Hoya chlorantha**
Altitude: ca. 800m.
Leaves 10 x 2, narrow acuminate both ends, reticulate, netted. Petiole 0.8-1.0 cm

Peduncle 5-6 cm, deciduous.

Pedicels 3-4 cm

Calyx oblong-lanceolate, acuminate obtuse, ciliate.

Corona ?

Corolla 1.7-2.0 cm out glabrous, in pubescent, 15-25 blooms. Straw yellow.

Characters for **Hoya filiformis**.
Altitude: 400m.
Leaves 6 x 2 cm nerves prominent above, thin, reticulate, white.

Petiole 0.8 cm

Peduncle 0.7-0.8 cm

Pedicels 0.7-0.8 cm

Calyx small lanceolate.

Corona ?

Corolla small white smaller than *H. pycnophylla* (0.9- 1.0 cm). Glabrous.

Material from the Second Herbarium Sheet Folder: Pinnately nerved leaves (6)

All these flowers are larger then for *Hoya attenuata* (by at least 60%)
None have leaves the shape of *Hoya betchei*.
All are repeat bloomers (persistent peduncles, so not *Hoya chlorantha*) except 8798 (1st blooming) but the leaves are too small and peduncles and pedicels are shorter otherwise its bloom size and number of flowers are the same as *Hoya chlorantha* which has deciduous peduncles.
All these have flowers much larger than those of *Hoya samoensis*, and all have peduncles and pedicels longer too.

Conclusions: Two are *Hoya whistlerii* 7605 and 7989. 3801 and 8798 are the same species and have small coronas with sway backed scales, a new species. 9456 has a flowers similar to W 2705 but the foliage is completely different (see comparisons on Page 119) it is a low elevation species, whereas the former was collected at 350m elevation. W 2705 was labeled *Hoya filiformis* but leaves are smaller, about 1/2 as many bloom, the flowers are about twice as large. I conclude this is also a new species

Material from the Third Herbarium Sheet Folder: Pinnately nerved leaves. (10)

All the sheets in this folder have small willow like leaves. The leaves of 10007 appear to be more fleshy, than the others.

As for *Hoya attenuata* W 3252 is in agreement on leaf size, petiole, peduncle and pedicel length but the corolla is larger (1.6 cm) and the lobes a little longer (ca. 0.5 cm). 9539 agrees in petiole, peduncle and pedicel length and also in coronal length and shape.

None of the specimens agree with *Hoya betchei* in leaf size (except possibly W 1106) nor in peduncle and pedicel length.

None have leaves as long as those of *Hoya chlorantha* nor peduncles or pedicels as long.

With *Hoya filiformis* none have pedicels this short nor flowers this small. W 1106, W 3252 and 10007 have similar leaves. With W 1106 the venation is not prominent above, the peduncle is much too long (3.2 cm) also the pedicels (2-2.2 cm). W 3252 more closely fits *Hoya attenuata*. 10007 has pedicels too long (2.5 cm).

Here we need to consider *Hoya diptera* Seemann (1866) a penninerved species native to The Fiji Islands (Type description poor).

Leaves elliptic ovate-elliptic 3.5- 8 cm long; 2-3.2 cm wide obtuse base, acuminate apex. Petiole 0.5 - 1.5 cm long.

Peduncle 1.0-1.4 cm long.

Pedicels 0.8- 2.0 cm long, all above either glabrous or with minute puberulance.

calyx 0.07-0.11 cm long and broad, ciliate

Corona 0.3-0.42 cm long, 0.16-0.18 cm wide apex obtuse acuminate base, flattened above, rounded beneath. Lobes reach the corolla sinuses.

Corolla 1.1-1.6 cm in diameter, yellow, puberulent within, lobes 0.4-0.6 cm long and broad.

Pollinia 0.5-0.6 mm long.

Three of these sheets have previously been referred to *Hoya diptera*: 9539, 10007 and 10339. 9539 is definitely not *Hoya diptera* (coronal scales altogether different), 10007 could be correct but pedicel is longer (0.25 cm) also sepals (0.18 cm). I consider *Hoya diptera* to be a moderately low elevation species and 10007 was found at 1060m elevation. 10339 has pedicels (2.3 cm) much longer, calyx (0.15 cm) longer with a shorter coronal lobe (0.25 cm), 400m altitude and other data seem to make this correct.

Conclusion: W 3252 and 9539 are *Hoya attenuata.* The other species I can not place with existing pinnately veined species descriptions.

Material from the Fourth Herbarium Sheet Folder: Pinnately nerved leaves. (20)

W 162, W 344, 445, W447, W 1796, W 2765, W 2793, 3645, W3110, W 3111, W 3243, W 3245, W 4443, W 5165, 6871 and 7020 have been previously referred to *Hoya betchei.*
8232, 8717 and 10447 have been referred to *Hoya vitiensis* Turill.

None of these entries have coronal lobes reaching the corolla sinuses which eliminates *Hoya diptera.*

If Dr. Schlechter' drawing of the pollinarium of this species is correct (and the retinaculum is minute as he says) then the pollinia are 4.5 times longer. As the retinaculum gets larger the ratio of these two lengths decreases. To maintain near this ratio we need to find retinacula in the 0.7 mm and shorter range. The upper limit would be 0.9 mm None of the species here approach this limit. The smaller retinacula are found in W 3243 (0.15 mm) and 10447 (0.17 mm). The next shortest group would be W 3111 (0.20 mm), W 3110 0.21 mm) and 8717 (0.22 mm)

The there with the smallest retinaculum: W 3243 (retinaculum 0.15 mm) foliage looks correct as to shape but is shorter and much narrower 5.5-6 x 1.4 vs. 6.9-.5 x 1.8-2.3 cm Peduncle much shorter 1.0 cm vs. 5-6 cm and also the pedicels 2.4 cm vs. 3.5 cm Schlechter's drawing shows ligules at base of sepals but W 3243 had no ligules. The calyx might fall within the range but seems a little small. Flower number 10 ? which would be few.

The next 10447 (which is labeled *Hoya vitensis*). Retinaculum 0.17 mm has leaves almost exactly like Dr. Schlechter's type sheet of *Hoya betchei*, it also has few flowers 8. This one has corolla lobes 1.12 cm vs. 1.1 cm, which might be close enough. Peduncles are 6.7 cm vs. 5-6 also close, and pedicels 3 cm vs. 3.5 also very close. Here the calyx is ciliate and *Hoya betchei's* is not. Elevation 530m. I would consider this to be **Hoya betchei.**

W 3111 has a retinaculum 0.20 mm long has about 11 flowers. Leaves are a little large and bases a little more narrow. Coronal lobes are 1.1 cm vs. 1.1 cm Peduncle is 5.2 cm in good accordance, pedicels 3.3 cm also a close match. Elevation 250m. not a high elevation. I would say this is also **Hoya betchei** although the retinaculum is a little large.

W 3110 has a retinaculum 0.21 mm long. Peduncle 3.0 cm and pedicels 2.9 cm long are both too short to be *Hoya betchei*. Coronal lobe is 1.05 cm vs. 1.1 cm long. Elevation 25m. also low as above. (See more details below).

8717 retinaculum 0.22 mm long. Peduncle correct, as is the pedicel length of 3.4 cm corolla lobes 1.08 cm short of 1.1 stated by Schlechter. Leaf length, shale and width are in close agreement. I would call this **Hoya betchei** in spite of the slightly long retinaculum.

Specimens in order:

Both W 162 and 445 might be *Hoya betchei*, since they have no flowers it cannot be determined at the present time. Both appear to have persistent peduncles so they can not be *Hoya chlorantha.*

W 344 is a first time blooming on the peduncle and the retinaculum is large 0.237mm Leaves are slightly shorter than *Hoya chlorantha.* Peduncle is 3.5 cm long vs. 5-6 cm; pedicels are 3.2 cm in agreement with *Hoya chlorantha.* Corolla is 1.50 cm vs. 1.7-2.0 cm 17 flowers in good agreement so I say **Hoya chlorantha**.

W 477 is a first time bloomer on the peduncle. The leaves here are shorter than the above at least 14 blooms. This could be *Hoya betchei* but would take microscopic work to determine the pollinarium characters, Leaves are small for *H. chlorantha.*

W 1796 first bloom on peduncle, retinaculum too long to be *Hoya betchei.* Leaves close to *Hoya chlorantha* length, shale and width, but peduncle and pedicels longer than either species, pod is very long too. Calyx is densely ciliate. This is also a marginate (edged pubescent) species. Undetermined.

W 2765 first bloom on peduncle, retinaculum too long to be *Hoya betchei*, calyx is glabrous, flower much too large, peduncle too short. Another margined species this one dark red. Peduncles do not fit any described Samoan species. This is not *var. tutuilensis* (a very incomplete and poor description) as coronal lobes are much longer and corolla marginate. Undetermined. New Species.

W2793 first bloom on peduncle so might be *Hoya chlorantha*, altitude 350m. The flowers are only buds so can not determine many characteristics. Leaves look like those of *Hoya betchei* so it could be this species and a little large for *Hoya chlorantha* also the

calyx is not ciliate like *Hoya betchei*. Peduncles and pedicels are both shorter than for either of these species.

3045 elevation 1200'. The flower is listed as purple and the leaves have netted anastomosing nervation so it fits the drawings (poor description) of *Hoya chlorantha var. tutuilensis*. It was also collected on the same island. Leaves are much wider than either *Hoya betchei* or *Hoya chlorantha*. Petioles are exceptional long. No flowers so not determinable at this time.

W 3110 elevation 250m. This is a maroon colored flower labeled as *Hoya betchei var. tutuilensis (Hoya chlorantha var. tutuilensis*). It is not this species nor variety. I would say it is the same as W 2765, pollinaria almost identical. It does not have short obtuse outer coronal lobes as for the variety and it is not pubescent all over on the inner corolla but is a pubescent margined species. The calyx is glabrous (that of *chlorantha* ciliate). Petiole and pedicels too short to be *Hoya betchei* or *chlorantha*. Same species as W 2765 and a new species.

W 3111 elevation 250m. determined as *Hoya betchei* (Schltr.) Whistler.

W 3243 elevation 400m. Another reddish flower and pubescent margined corolla inside, although the peduncle and pedicels are shorter than on either W 2765 or W 3110. Closest to *Hoya betchei* but many differences, undetermined at this time.

W 3245 elevation 400m. The photo of this looks very much like that of W 3111, leaves, peduncles and pedicels are similar, the coronal scales are shorter. This is a repeat bloomer so it is not *Hoya chlorantha,* and it is a fascicle bloomer, differing from W 3111 which blooms from fine basal bracts. The calyx is pubescent and the sepals very ciliate so what is it. Pollinarium with long pollinia 0.70 mm and retinacula 0.26 cm long. Undetermined.

W 4443 elevation 550m. Leaves long slender and willow like. The peduncle length (2-3.8 cm does not fit any of the descriptions of Samoan hoyas. It is a repeat bloomer otherwise it has leaves and pedicles similar to *Hoya chlorantha*, flower of similar size. The Retinaculum is very large. Sepals are ciliate and with scattered pubescent hairs. Undetermined.

W 5165 elevation 580m. This is a large flower 2.40 cm flattened with a relatively small corona . Leaves are small 4-6 cm long x 1.5 cm wide. This species has leaves more like those in the third folder i.e. willow like, but the flowers are large 2.6 cm in diameter flattened. Although the leaves a re a little small I'd say this species is **Hoya chlorantha**.

6871 elevation 600m. Leaves smaller than for *Hoya betchei* also Peduncle way too short 2-2.5 vs. 5-6 , pedicels 2.5 cm vs. 3.5, corolla lobes 0.95 cm vs. 1.1 cm It does not fit any named Samoan species.

7020 elevation 750m. Leaves too small for *Hoya betchei*, peduncle 2.5 cm vs. 5-6 cm. pedicel 2.8 cm vs. 3.5 cm Corolla correct size but only margined pubescent. I'd say same species as W 3245.

8232 low elevation. This is labeled *Hoya vitiensis*. Sheets of this species have a lot of variation and I have always contended at least 2 species are involved. The leaves here are 10.3 - 13.7 cm vs. 10 cm and 4-1.8 cm wide vs. 7 cm The sepals here are glabrous vs. distinctly ciliate. Peduncle 5.3 cm vs. 4.5 cm pedicels 2.8 cm vs. 3.8 cm corolla 2.4 in diameter vs. 2 cm (a fairly close match), maroon flower color also matches. Corona lobes 0.43 cm x 0.15 cm vs. 0.4 cm x 0.275. Pollinia 0.65 cm long vs. 1 mm I conclude there are too many discrepancies for this to be *Hoya vitiensis*. Its leaves are larger than any other Samoan species.

8366 elevation 630m. Labeled *Hoya vitiensis*. Leaves 5.8 -7.2 cm long and 2 - 2.5 cm wide. way to small to be as labeled also corolla inside glabrous except for narrow margine of pubescence, not villous as with labeled species. Peduncle 4.1 cm long, pedicels 3.4 cm long (close to as labeled). First blooming. Peduncle a little shorter than for *Hoya betchei* or *Hoya chlorantha.* Flower small 1.30 cm flattened. Undetermined.
8717 elevation 360m. Labeled *Hoya vitiensis*, leaves 7.4 - 8.0 cm x 2 - 2.2 cm (too small for labeling, but close to *Hoya betchei*, but too many flowers per cluster (20) since it is a first bloom it may be *Hoya chlorantha*. Peduncle 6 cm and pedicels 3.4 cm also fit this later species. Corolla 2.16 cm in diameter is also close. Retinaculum is too large to be *Hoya betchei*, but check against the margined (fringed) species above. I conclude this species is **Hoya chlorantha**.
10477 elevation 350m. Labeled *Hoya vitiensis*. Determined to be **Hoya betchei** (see above)

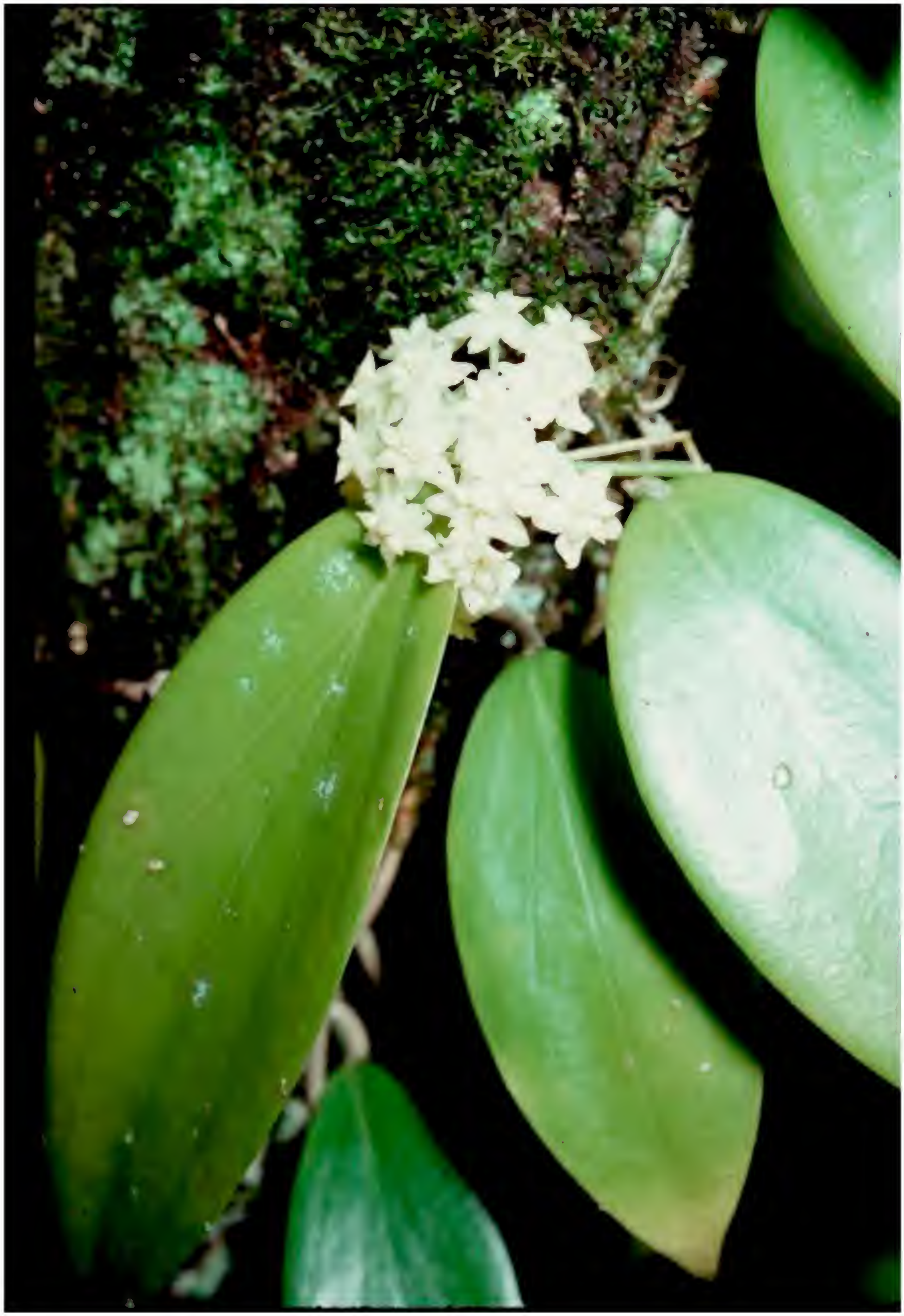
Hoya Comparisons

	pottsii	pycnophylla	samoensis	upoluensis
Date pub.		1908	1866	1893
Altitude		10m	300m	600m
Leaf	ovate-cordate acuminate	thick, leathery small & narrow	elliptic-ovate acuminate	elliptic-lanceolate acuminate
base	cordate glabrous		broadly cuneate glabrous	narrow
length		9-10 cm	7-10 cm	7-15 cm
width		2-3 cm	3.5-5.8 cm	
Nerves	**not below** **3 distinct above** **palmate**	both surfaces 5 tuplinerved	both surfaces 5 tuplinerved	both surfaces 5 tuplinerved
Petiole	1.2 cm	1 cm	1 cm	**2.5 cm**
Peduncle	5 cm	5-6 cm	5.5-6.5 cm	**3-5 cm**
Pedicels		1.6 cm	1.5-2 cm	**2-2.5 cm**
Calyx	ovate	oblong 0.15 cm glabrous just reaches sinus	0.15-0.2 cm glabrous **does** not reach **sinus**	narrowly rounded 0.2-0.25 cm glabrous just reaches sinus
Corolla	glabrous out pubescent in globose tight 29 flowers white	glabrous **0.9- 1.0cm small** 20 flowers white	glabrous out **pubescent in** 1-1.2 cm 20 flowers white	glabrous 1.2- 1.5 cm many white/purple center
Corona			ovate-elliptic both ends acute 0.35-0.4 cm long 0.15-0.2 cm wide concave	 0.5 cm long 0.2 cm wide 0.12- 0.15 cm diam.

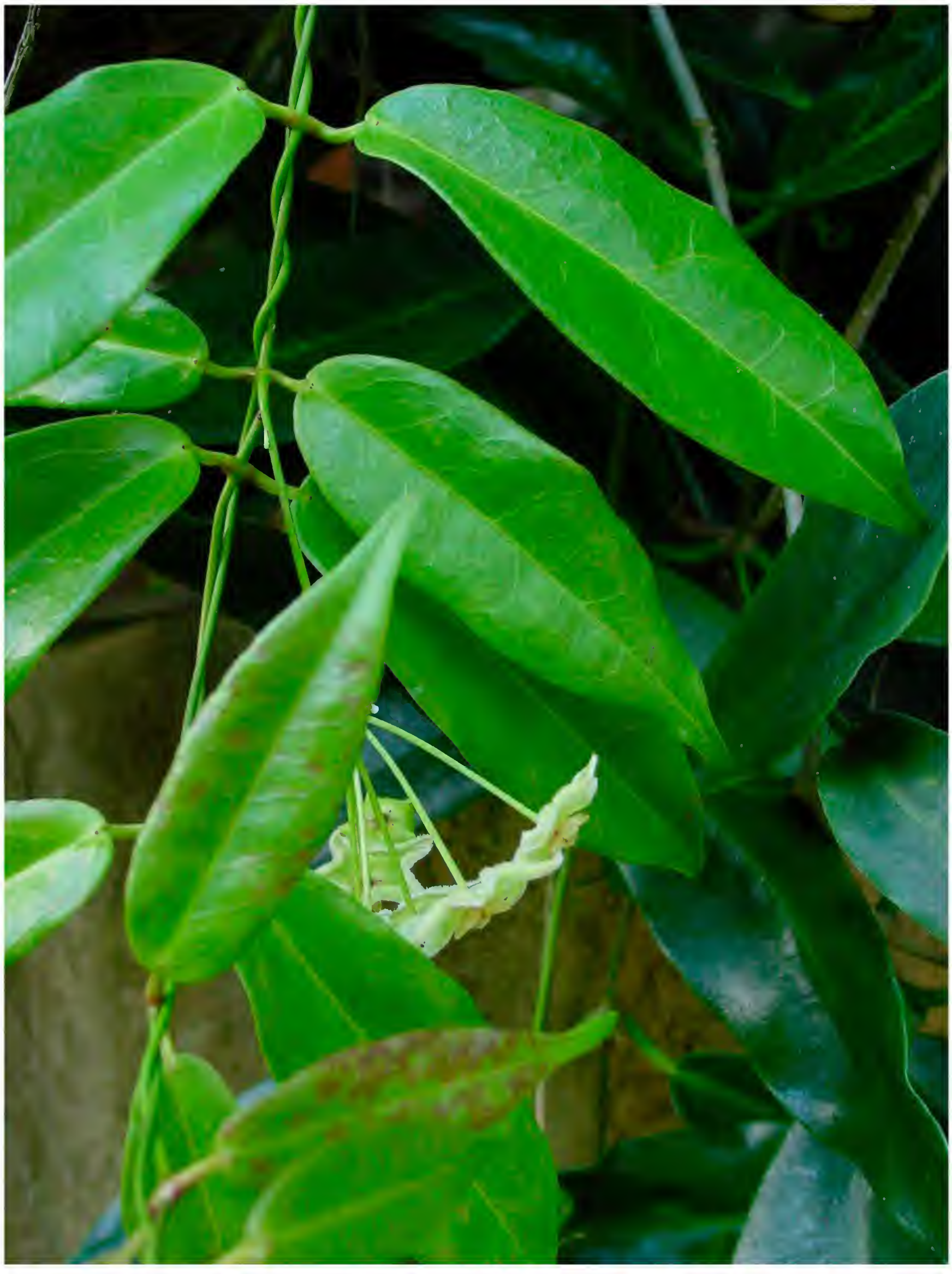
Hoya Comparisons

	attenuata	betchei	chlorantha	filiformis
Date pub.	1935	1908	1908	1908
Altitude	750m	high	300m	low
Leaf	elliptic-lanceolate	elliptic-lanceolate	leathery	lanceolate-ovate
	attenuate	leathery	pinnate-reticulate	pinnate-reticulate
				thin
apex	acute	acute	narrow acuminate	acuminate
base	obtuse	obtuse	**narrow**	
	glabrous	glabrous	glabrous	
length	5-8 cm	6.9-9.5 cm	10 cm	6 cm
width	1.6-2.8 cm	1.8-2.3 cm	2 cm	2cm
	margins revolute			
Nerves	pinnate	pinnate	pinnate	distinct upper
	anastomosing			reticulate
	netted			
Petiole	0.8-1.1 cm	1 cm	0.8 cm	0.8 cm
	grooved			
	glab. or pub.			
Peduncle	1-2 cm	5-6 cm	5-6 cm	**0.7-0.8 cm**
	glab. or pub.		**deciduous**	
Pedicels	2 cm	3.5 cm	3-4 cm	**0.7-0.8 cm**
	glab. or pub.			
Calyx	obtuse	ovate-obtuse	oblong- lanceolate	lanceolate
		ligules		acuminate
	glabrous	glabrous	**ciliate**	
	0.1-0.15 cm	0.2 cm		
Corolla		campanulate	**flat**	
	glabrous out	glabrous out.	glabrous out.	glabrous
	pubescent in	pubescent in	pubescent in	**glabrous**
		ciliate		
	1.0 cm	2.2-2.4 cm	**1.7 -2.0 cm**	**less than 0.9 cm**
	creamy white	few	green/ **15-25**	white
		large flower		
Corona	acute in			acute
	obtuse out		obtuse	obtuse
	0.15 cm			

Below are photos taken by Dr. Art Whistler in Samoa, who has devoted much of his time and energy to studying the flora of there islands.



Photos by Ted Green, Kaaawa, Hawaii of Hoya chlorantha



Hoya tiatuilaensis Kloppenburg 2013

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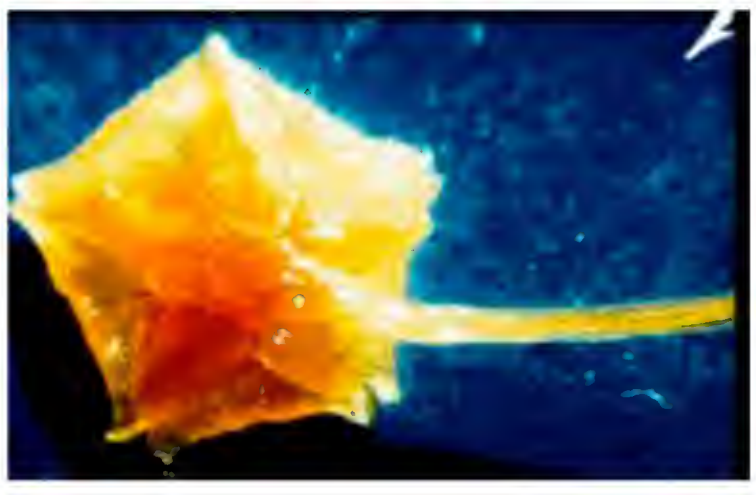
Hoya tiatuilaensis Kloppenburg sp. nova Type 9089 HAW hic designatus similis *Hoya samoensis* Seemann sed partes omnes parvi, folia 5.5 -6.5 cm x 3 – 3.5 cm contrstre 7 – 10 cm x 3.5 – 5.8 cm; pedunculi 4.5 cm longi contrstre 5.5 – 6.5 cm; coronae lobis 0.20 cm longi x 0.10 cm, lati contrstre 0.35 – 0.40 cm x 0.15 – 0.20 cm, differt.

Description of the Herbarium sheet 9089 HAW:

9089 as *Hoya pottsii* Traill, 5 Jan, 1993 Tiatuila, Samoa. Vine with cream colored flowers, sap not noticeably milky, occasional, but only one seen in flower, in the ridge forest on Tiataula ridge east of Vatia. Elevation 180 m. 2 stems 5 leaves, 1 flower globose cluster of ca. 34 flowers. 1 stem with adventitious roots all along. Leaves glabrous, broadly ovate-lanceolate, shortly attenuate, apex acute, base rounded but not cordate, 5.5 - 6.5 cm long 3 - 3.5 cm widest nearer the base, nervation quintuplinervis 5 distinct on both surfaces, same color as the leaf, secondary nerves some looping near the margins, primary nerves extend to near the apex. Petiole glabrous, not thin 1.5 cm long probably grooved above, same color as the stem, circular gland at the attachment above. Internodes glabrous, mostly 8 cm long, terete, 0.2 cm in diameter, roots up to 3 cm long, fine, nodes not much enlarged. Peduncle glabrous, straight, 4.5 cm long, terete rachis a little longer, fascicles.
Pedicels, glabrous, very fine, terete, 34 flowers. 2 cm long, light colored.

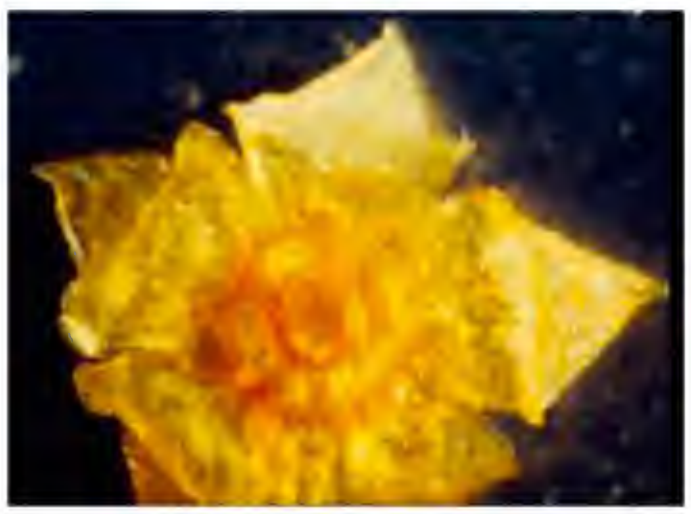
Note: not *H. pottsii*, leaf quintuplinervis not palmate and base not cordate. Flower relatively small, Calyx large, reaches sinus of corolla.

Micro Photos of flower from sheet 9089:



Outside view of the flower enlarged about 8X. Pedicel is glabrous, terete, short, 1.05 cm long 0.05 cm in diameter, Calyx is very large, outside granulose, inside smooth, sepal apex reaches the corolla sinuses. Flower not yet opened.

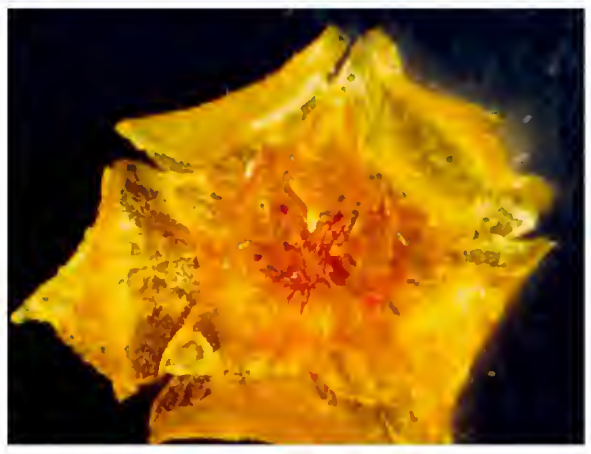
Calyx: Left outside view, right inside view enlarged about 8X., glabrous. Sepals 0.13 cm long, 0.13 cm at the widest, near the base. One ligule seen.



Outside view of the corolla enlarged about 8X. This surface is glabrous, central ring raised (convex).

Sinus - sinus	0.25 cm
Sinus - center	0.21 cm
Sinus - apex	0.38 cm
Widest	0.33 cm
Apex - center	0.55 cm

So the flower diameter flattened is 1.10 cm Lobes widest out from the sinus area.



Inside view of the flower enlarged about 8X. Surface is finely and evenly pubescent. Coronal apex is acute. Inner lobe long apiculate, dentate, do not reach the center. Inner lobe can be seen as yellow linear line near the center

Top view of the corona enlarged about 8X. Outer apexes seem to be emarginate. Lower surface channeled.

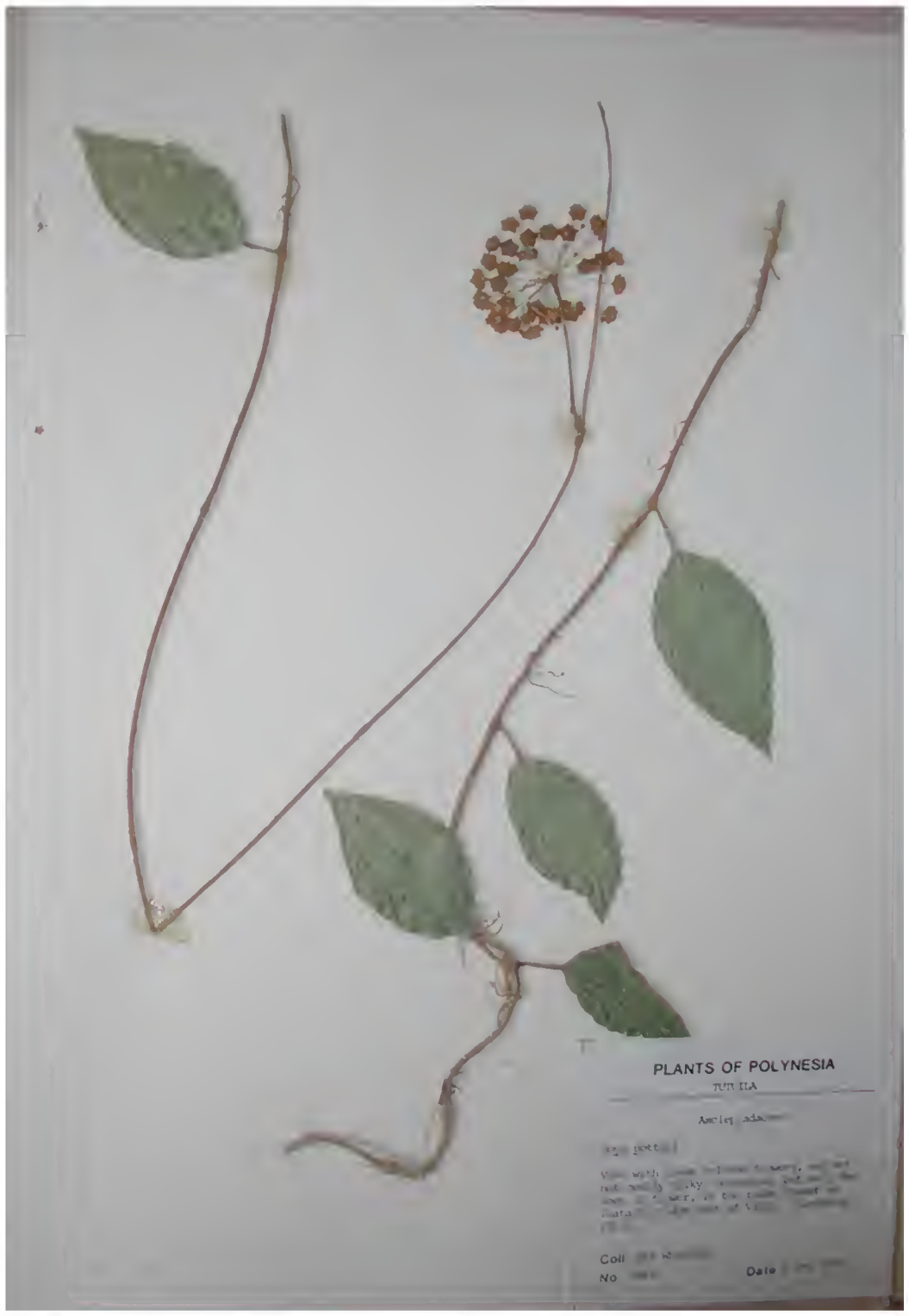
Apex - apex	0.20 cm
Apex - center	0.23 cm
Widest	0.10 cm near the inner lobe.
Anther wing - aw.	0.15 cm
Retinaculum - ret.	0.08 cm
Aw. - center	0.13 cm
Ret. - center	0.05 cm

Anther wings are very bulbous

Several retinacula enlarged about 82X. Head is long with shoulders well down, waist only slightly narrower, and hips a little extended.

length	0.20 mm
shoulder	0.13 mm
waist	0.09 mm
hip	0.10 mm
extensions	0.08 mm

Pollinia here still in the anther sack enlarged about 82 X. The length is ca. 0.55 mm long and 0.20 mm widest.



Reduced picture of the type sheet, to the right.